UTAH ENERGY OUTLOOK
1997

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CONTENTS

EXECUTIVE SUMMARY

The *Utah Energy Outlook 1997* presents forecasts for the 3-year period 1997-1999. Forecasts include local energy prices, energy resource production (oil, natural gas, coal and uranium) and state-wide energy demand (motor fuels, coal, natural gas and electricity). The major projections are included in the following summary.

Crude Oil and Motor Fuels

- Crude oil production in Utah is at its lowest point in more than 10 years. Although production is projected to decrease through 1999, the decline should be less than in previous years due to enhanced technology use. From 19.4 million barrels in 1996, crude oil production should drop to approximately 18.8 million barrels in 1999.

As Utah production declines, local refineries rely more heavily on crude oil from outside the state. Currently a net importer of crude oil, Utah is expected to consume an increasing volume of out-of-state oil.

- One reason why crude oil production in Utah is declining is the low market price. Plentiful supplies of crude oil on the world market have maintained low international market prices, and Utah prices generally follow world-market trends. At just over $21 per barrel in 1996, prices are expected to remain flat through 1999.

- Low crude prices mean low motor fuel prices, and the affordability of gasoline and diesel fuel is a strong impetus for consumption. Both gasoline and diesel fuel prices are projected to remain steady at approximately $1.21 and $1.07 per gallon, respectively, through 1999. Low prices, along with population growth, should induce higher fuel consumption.

- In-state consumption of motor gasoline and diesel fuel is at an all-time high and continues to grow. At just under 1.5 billion gallons in 1996, gasoline and diesel consumption is expected to reach 1.6 billion gallons per year by 1999.

Natural Gas

- Natural gas production in Utah declined during the last 2 years, but is poised for a turnaround. Coalbed methane is currently being developed in central Utah and is expected to provide a large enough source of natural gas to boost Utah's total production from 267 billion cubic feet in 1997 to 275 billion cubic feet by 1999. Although local demand for natural gas is on the rise, Utah is expected to continue to produce more gas than it consumes, and should remain a net exporter of gas through 1999.

- Utah natural gas wellhead prices rebounded in 1996 and are projected to be stable at $1.39 per thousand cubic feet during the next 3 years. End-use prices have been falling as well, but show a similar rebound and remain constant in inflation-adjusted dollars through 1999. Residential and commercial prices should remain steady at approximately $4.50 and $3.40 per thousand cubic feet, and industrial prices are projected to drop from $1.95 to $1.68 per thousand cubic feet.

- Relatively low gas prices and strong population growth have pushed natural gas consumption in Utah higher than ever. Consumption increased in all sectors in 1996, and is projected to continue to increase during the next 3 years. From 128 billion cubic feet in 1997, total gas consumption in Utah is expected to rise to 139 billion cubic feet in 1999. Natural gas has become the heating fuel of choice and its popularity may grow as more gas is used for power generation and transportation.

Coal

■ In response to increasing demand by electric utilities outside Utah and by several Pacific Rim nations, Utah coal production has reached record levels and is projected to continue to rise for the next 3 years. Utah produces high-Btu, low-sulfur coal that is becoming more popular as stringent national air pollution standards take effect. From 28.5 million tons in 1997, Utah production should reach 29.5 million tons in 1999. Utah is a net exporter of coal and will continue to be throughout the forecast period.

■ Coal prices are projected to continue their decline. The decline is driven in part by technological innovation in coal mining that continues to improve productivity. At $18.50 per ton in 1996, the average mine price for Utah coal is projected to decline to $17.61 per ton in 1999.

■ More than 87 percent of the coal consumed in Utah goes to electric utilities. Projected demand increases by Utah utilities are expected to push total consumption up from 14.6 million tons in 1996 to 15.9 millions tons in 1999.

Electricity

■ Electricity prices are projected to remain mostly unchanged in constant, inflation-adjusted dollars through 1999. Residential and commercial prices should hold at approximately 7 cents and 6 cents per kilowatthour, respectively, and the industrial price is expected to decline from 3.6 cents to 2.9 cents per kilowatthour. However, electricity industry deregulation may have important consequences for electricity prices. Precisely what these effects will be remains unclear.

■ Strong population growth is expected to push electricity consumption higher each year of the forecast period. New commercial construction, larger average home sizes, and increased use of electricity-intensive appliances and equipment will all contribute to expanding state demand for electricity. Increasing several percent each year, total electricity consumption in Utah should grow from 18.9 gigwatthours in 1996 to 20.5 gigawatthours in 1999.

■ Utahns consume only two-thirds of the electricity generated within the state. Most of the remainder is exported to California. Utah is likely to remain a net exporter of electricity beyond 1999.

1. INTRODUCTION

In 1996 Utah citizens and businesses spent close to $3 billion to provide heat, light, cooling, power and locomotion. In total, Utah end users of energy consumed 126 billion cubic feet of natural gas, 18,900 gigawatthours of electricity generated by burning 9.5 million tons of coal, and nearly 1.5 billion gallons of motor fuel. Although some improvements to energy efficiency have been made, the current trend in population growth, economic growth, increasing preference for larger homes and renewed popularity of large automobiles are expected to push energy consumption even higher.

Utah's expanding demand for power and fuel currently drives a strong local energy industry. In 1996, Utah workers extracted 27 million tons of coal, 19.5 million barrels of crude oil and 290 billion cubic feet of natural gas. In addition, Utah petroleum refineries produced 2.5 million gallons of motor fuels and other petroleum products, and in-state power plants generated nearly 30,000 gigawatthours of electricity. The Utah energy industry is expected to remain strong through 1999.

The *Utah Energy Outlook 1997* looks into Utah's energy future and estimates energy demand and production during the years 1997-1999. It offers a closer view of not only how much energy Utahns consume, but how energy intensive our personal lives and economy have become.

To put energy use in perspective, in 1996 the average Utahn consumed approximately 500 gallons of gasoline for transportation. In addition, each Utahn consumed an average of 27,000 cubic feet of natural gas and 2,500 pounds of coal (in the form of electricity) for residential heat, light and power. In the years ahead, energy consumption will depend heavily on the economy, technology, energy prices, weather and personal choices.

Data Sources

Most historical data for this report comes from the Utah Office of Energy and Resource Planning's (OERP) Energy Data Information System (EDIS), a state energy database compiled from a variety of public and private sources. The primary public data source is the Energy Information Administration, an independent statistical agency within the U.S. Department of Energy.

Other sources include the Utah Department of Transportation, Utah Tax Commission, Utah Department of Commerce, Governor's Office of Planning and Budget, various private oil, gas and pipeline companies, local refineries, and the local utilities including Mountain Fuel and Utah Power.

Forecasting Procedures and Caveats

A variety of forecasting procedures were used to produce the projections in the *Utah Energy Outlook 1997*, including time-series analysis, econometric modeling and extrapolation. Although these analytical techniques produce reasonable projections of historical trends, it is important to note that every forecast is highly dependent on a set of assumptions. All assumptions regarding the future are uncertain, and forecasts are unlikely to be completely accurate.

Assumptions

In order to develop energy forecasts, assumptions must be made regarding variables such as population growth, economic growth, temperature variation and energy prices. Utah's population and economic activity, combined with the current state of energy technology, generally determine the scale of

energy consumption. Current energy market conditions, energy prices and weather conditions provide additional influences on both energy production and consumer behavior. Energy projections will depend to a large extent on assumed future values for these variables.

Utah's population and economy are both expected to grow substantially during the next three years. Population growth is projected to be approximately 2 percent per year, while growth in personal income is projected to be as high as 6 percent per year. While some variation in these projected rates is likely, growth will certainly occur and push energy demand to record highs.

Temperature variation is nearly impossible to predict accurately; yet, seasonal and sporadic changes in temperature can have the most immediate effect on energy consumption. In the case of unusually cold weather, for example, consumption of natural gas for heat will immediately rise. Unfortunately, predicting such an event more than a few days in advance is impossible. In general, we can be sure only that monthly temperatures will follow an *average* pattern, and all forecasts based on that average temperature assumption will necessarily fluctuate according to above- and below -average temperature events.

Even more unpredictable than weather events are energy prices. While some fuel prices, such as those of coal, change little from month to month, other prices, such as motor fuel, can change dramatically from one week to the next. End users of energy fuels respond in varying degrees and at varying speeds to price changes. However, consumers generally decrease fuel use after prices go up, and vise versa. A sudden shift in crude oil prices, for example, could happen at any time and would quickly be translated into lower or higher motor fuel prices. Fuel consumption would then rise or fall accordingly and new, unexpected consumption levels could persist through the forecast period.

In general, fuel prices are assumed to follow historical trends or, if no clear trends exist, are presumed to remain constant (in inflation-adjusted dollars). All consumption forecasts therefore depend on prices continuing along their assumed path, and any unexpected price deviations could significantly alter actual energy consumption. Chapter 2 contains a detailed outline of price forecasts.

2. ENERGY PRICES

The dominant trend in energy prices in recent years has been one of relative stability. For several years in the late 1980s and early 1990s, energy prices were slowly rising in current dollars and relatively flat in constant dollars. Price deflation now prevails, and most prices are relatively flat in current dollars and gradually falling in constant dollars.

Another important characteristic of energy prices is that while Utah is currently enjoying relatively low and stable prices, energy markets can exhibit extreme price volatility at any time. This price volatility generally derives from international developments, such as tension in the Persian Gulf, or supply constraints during unusual weather events, such as an early cold snap.

The most commonly measured energy prices are “wellhead price” or "field price" for crude oil and natural gas production, “average mine price” for coal production and “end-use price” for transportation (diesel fuel and motor gasoline) and utility fuels (natural gas and electric power). In constant dollars most prices have been falling in the past decade which, in turn, has encouraged growth in energy demand. Energy efficiency and energy conservation improvements will likely suffer in this environment of low and stable energy prices.

Crude Oil

In constant 1996 dollars, crude oil prices have steadily declined since 1980. At that time, crude oil was posted at over $50 per barrel (in constant 1996 dollars). The 1986 collapse in oil prices triggered the downward drift that has continued to this day. Domestic oil prices are determined largely by the international oil market. Oil prices were particularly low during 1993-1995, with Utah oil hovering in the $17-$18 per barrel range. Only at the end of 1996 did Utah's price recover to $21.10 per barrel. All indications are that the Utah crude oil price will continue to be relatively flat over the forecast horizon. (See Figure 2.1.)

The Energy Information Administration (EIA), in recent short-term and long-term energy projections, anticipates essentially stable oil prices. From a 1996 base of about $20.50, EIA forecasts annual growth of only 0.4 percent through the year 2020. This is consistent with other major energy forecasters, such as the WEFA Group, the Gas Research Institute (GRI) and Data Resources, Inc. (DRI). In contrast to energy price forecasts of a decade ago, the

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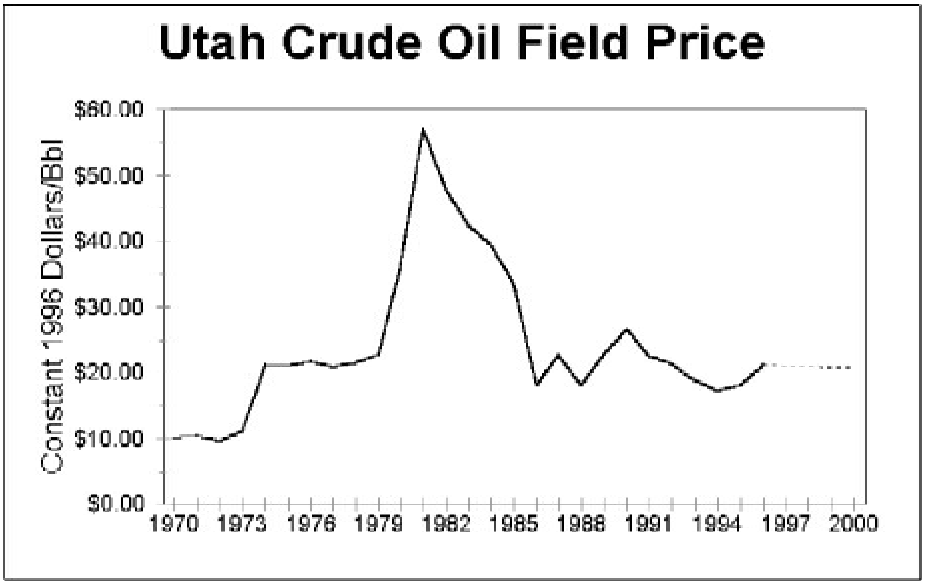

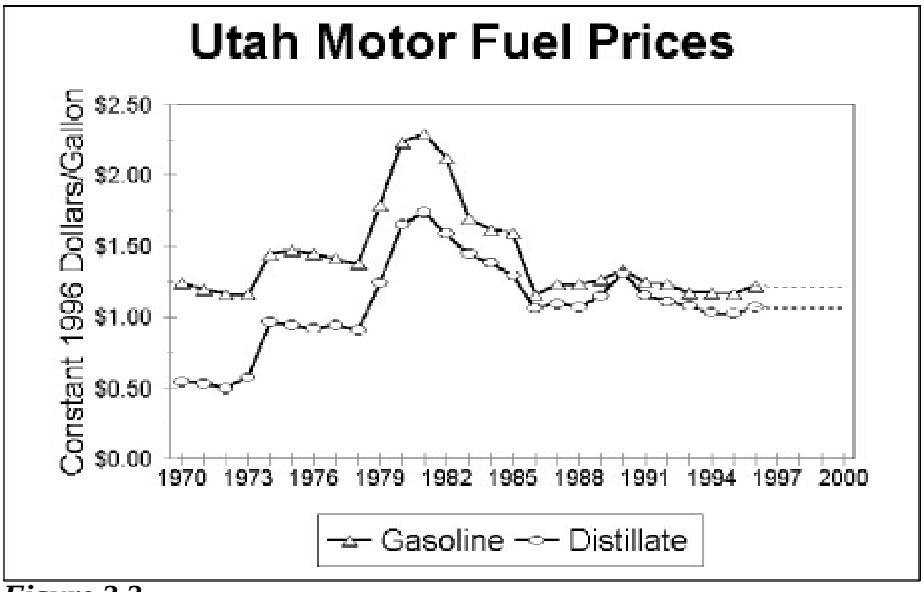

Figure 2.2

consensus among long-term energy forecasts is for remarkably flat and stable oil prices. EIA's forecast, for example, anticipates world oil prices declining from the 1996 base of $20.50 a barrel to $19.11 by the year 2000.

World oil prices at the beginning of 1997 began the year at about $23.50 per barrel, with Utah crude oil at about $21.10 per barrel. Prices are projected to decline as world oil production increases offset growth in world demand. This forecast assumes no major political or military instability in the Middle East, as well as the U.N. Security Council renewal of Resolution 986 every 6 months. The resolution allows Iraq to continue exporting about 750,000 barrels per day. Potential Iraqi supply, in addition to supply from several other international sources for oil, is expected to maintain significant downward pressure on the world oil price.

Refined Products

Motor gasoline and diesel fuel prices respond to underlying changes in the price of crude oil. A large increase in the price of crude oil, for example, will be passed on to refined petroleum products. In general, for every dollar change per barrel in crude oil price, the gasoline price will shift approximately 3.5 cents.

Although prices for the two transportation fuels respond to changes in the crude oil market, motor gasoline and diesel fuel prices also follow seasonal consumer demand patterns. In response to increased driving, motor gasoline prices typically rise 5 to 10 cents in late spring. Significant year-to-year variation does occur. For example, the gasoline price peak in 1996 was significantly higher than the price peak in the spring of 1997.

Gasoline pump prices should average around $1.26 per gallon in the Salt Lake City area through the end of 1997. (See Figure 2.2.) Barring unforeseen events, the price of gasoline should remain relatively stable for the next few years. Nevertheless, while the average price is expected to be stable over the forecast period, there may be short-term price volatility.

Natural Gas Wellhead

Because oil and gas do not compete directly in most markets, domestic natural gas prices are less responsive than crude oil prices to

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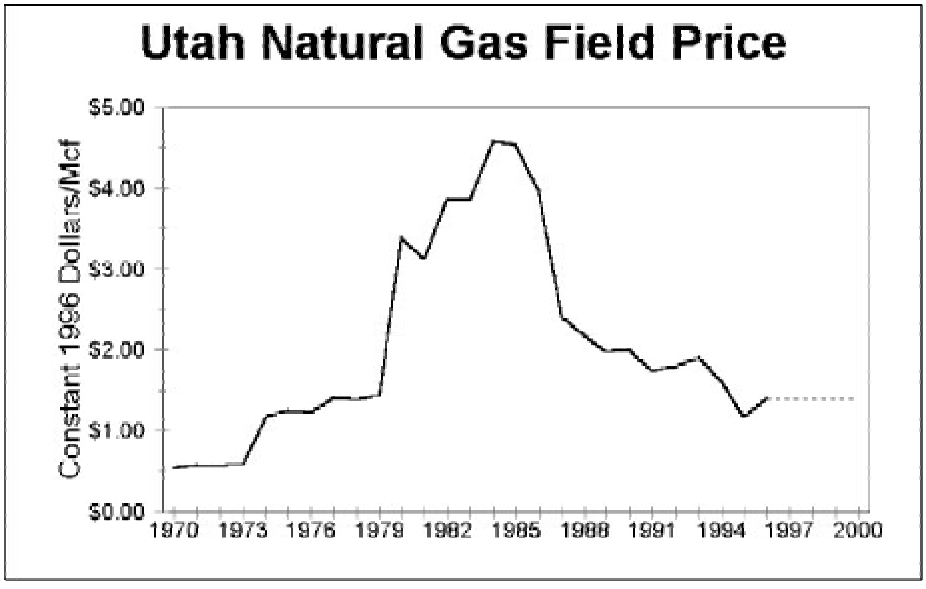

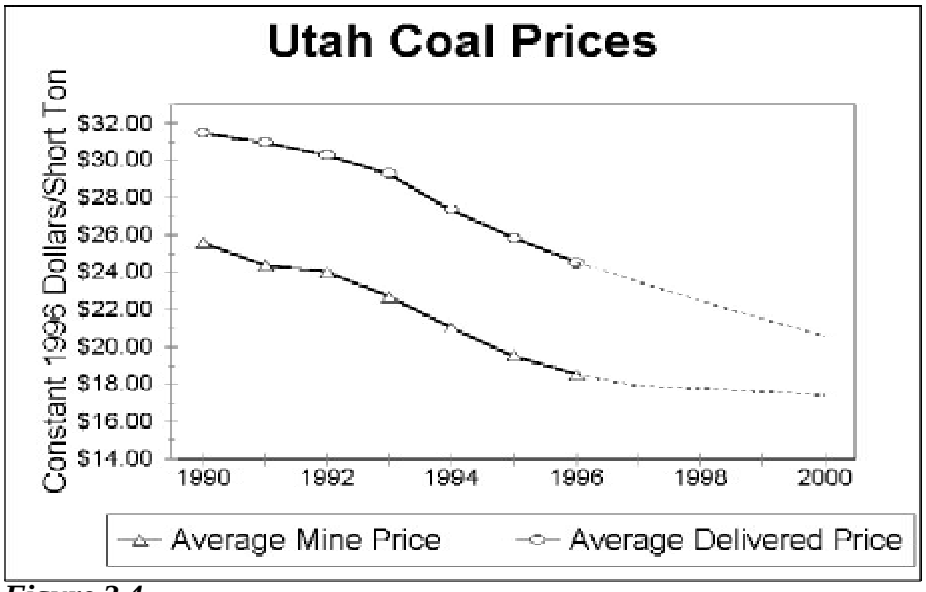

Figure 2.4

changes in world oil prices. However, the natural gas wellhead price has typically tracked crude oil wellhead prices, with both declining in the early 1990s.

The year 1995 was unusually poor for Utah natural gas producers. From a price of $1.54 per thousand cubic feet (mcf) in 1994, the price sank more than 25 percent to $1.15 per mcf in 1995. Most of that decline, however, was recovered in 1996 when the natural gas wellhead price bounced back to $1.39 per mcf. By December 1996 the natural gas spot market price had increased sharply. Relatively low natural gas production and low inventories at the national level contributed to this development.

More than for other fuels, natural gas prices have been marked by significant spot market price volatility. The increase in spot market prices in late 1997 is similar to the pattern found in late 1996. However, the high spot market prices of December 1996 was not sustained, and a similar pattern is anticipated for the 1997-1998 winter season. The Utah natural gas field price is expected to be flat in constant dollars over the forecast horizon. (See Figure 2.3.)

Coal

From 1990 to 1993, coal prices fluctuated around $21 per ton. Prices hit a new low of $20.07 in 1994. In 1995 another new low was established at $19.11 and still another one in 1996 at $18.50.

Decreasing average prices represent a shift in sales from high price markets to low price markets. Increased sales occurred mostly in the export market and new contracts with eastern utilities which were at the lower end of price scale. Sales reductions occurred in markets at the upper end of the price scale, such as with IPP (about 0.7 million tons). This, therefore, indicates a possible "bottoming out." In the near term, the average price will most likely remain stable. For 1997 the average price of coal will be approximately $18.32 per ton.

It is important to bear in mind that Utah's coal prices are also influenced by the world price of coal. As the share of coal exports increases as a percentage of total production, the effect of export prices on the average price of coal becomes more relevant.

Other factors also tend to soften prices. Technological developments in coal production and handling continue to lower the break-even point for production and therefore reduce prices. Large volume production allows operators to reduce the profit margin per ton by lowering prices, yet still keep overall profit high. The abundance of coal on the international market will continue to exert pressure on Utah producers to keep prices competitive.

There are also other forces acting to increase the price of coal, specifically Western coal. On January 1, 2000 the second phase of the Clean Air Act Amendments of 1990 becomes effective, and in anticipation of that event a renewed wave of national interest in low-sulfur coal is expected. In 1997 the interest in new sources of low-sulfur coal has not been substantial, but from mid-1998 into 1999 some strong interest in Western coal is anticipated. Utah coal, now at the upper end of production capacity, should respond to the greater demand by firming up prices. (See Figure 2.4.)

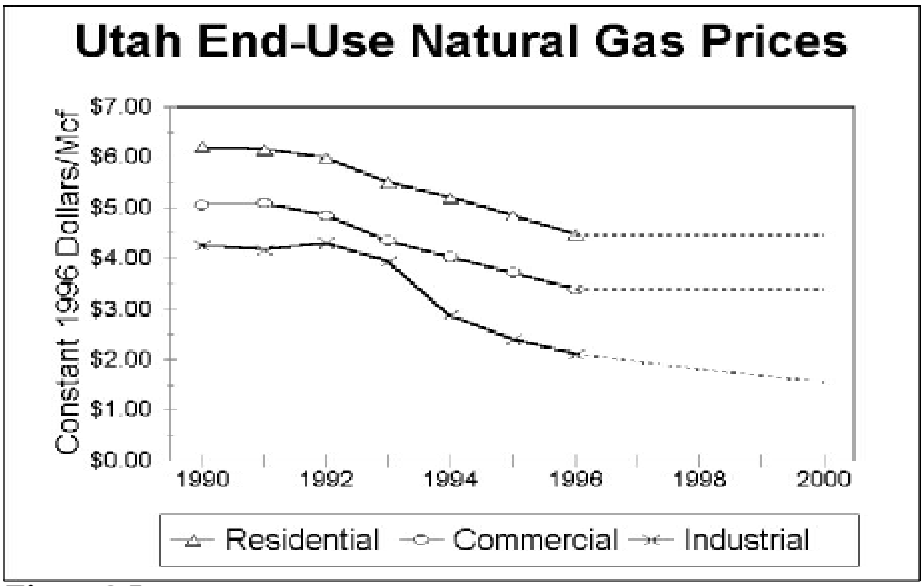

Figure 2.5

Natural Gas End Use

While natural gas prices have also declined in recent years, occasional natural gas spot market volatility will affect utility supply and price patterns. When natural gas spot market prices spike, for example, local natural gas distribution companies will seek relief from the Public Service Commission.

Utah end-use natural gas prices have been declining in current dollars since 1991. This decline is even more remarkable in constant 1996 dollars. From 1991 to 1996 residential prices declined from $6.14 to $4.47 per mcf, commercial prices fell from $5.08 to $3.38 per mcf and industrial prices dropped nearly 50 percent from $4.17 to $2.10 per mcf. (See Figure 2.5.)

Residential and commercial prices should remain relatively flat and stable over the forecast horizon. Due to the ability of large consumers to purchase gas directly from the field, industrial natural gas prices are likely to continue their long-term decline.

Electric Power End Use

Along with other fuels, electric power prices in Utah have also gradually declined since 1985. Measured in constant 1996 dollars, electric power prices for the residential sector have fallen from $0.109 per kilowatt hour (kWh) in 1985 to $0.069 per kWh in 1996; the commercial sector price fell from $0.096 per kWh to $0.059; and the industrial sector price fell from $0.070 per kWh to $0.036 per kWh. (See Figure 2.6.) Electric power prices for the residential and commercial sectors are anticipated to remain flat in constant dollars over the forecast horizon. Strong purchasing power by large industrial consumers, in addition to gradually declining fuel costs for generation, should allow industrial electric prices to continue their decline.

Most energy observers look to the California electricity market, with its aggressive deregulation, as an indicator of future trends. Retail wheeling in California is set to begin January 1, 1998.

The effect of electric power deregulation has been the subject of much speculation and uncertainty. Precisely what effect electric deregulation will have on current market prices is uncertain at best.

Uranium

Uranium prices declined steadily during the 1980s until 1991, and

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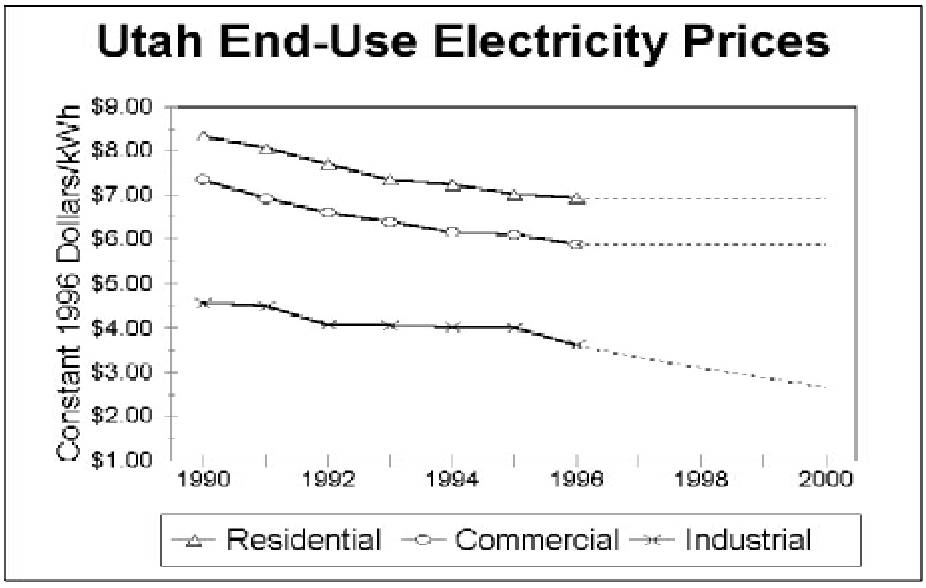


leveled off for most of the current decade. In May 1996 the restricted price of uranium stood at $15.35 per pound. Since then it has fallen with some minor fluctuation to $12.75 in the last quarter of 1997. However, an upturn is expected in early 1998, and the average price should be approximately $12.64 per pound for 1998. Uranium prices are expected to rise gradually during the forecast period and approach $13.33 per pound in 1999.

Excess supplies of uranium in the late 1980s and early 1990s were largely responsible for the dramatic price decline. Much of the excess supply came from Russia's vast stockpile of weapons-grade uranium which was sold at prices well below the market value. Declining prices resulted in a general slow down in uranium production worldwide. World production fell to 76 million pounds per year, with an additional 15 to 20 million pounds per year available from disassembled nuclear weapons.

World uranium consumption remained well above production levels at 120 million pounds per year. A similar imbalance existed in the United States where national production was only 7 million pounds per year as compared to annual consumption of 36 million pounds.

The difference between production and consumption was met by drawing on abundant world uranium stockpiles. At around 650 million pounds, world stockpiles prevented the supply-demand imbalance from becoming a problem for many years. However, declining stockpiles are now resulting in a firming up of prices.

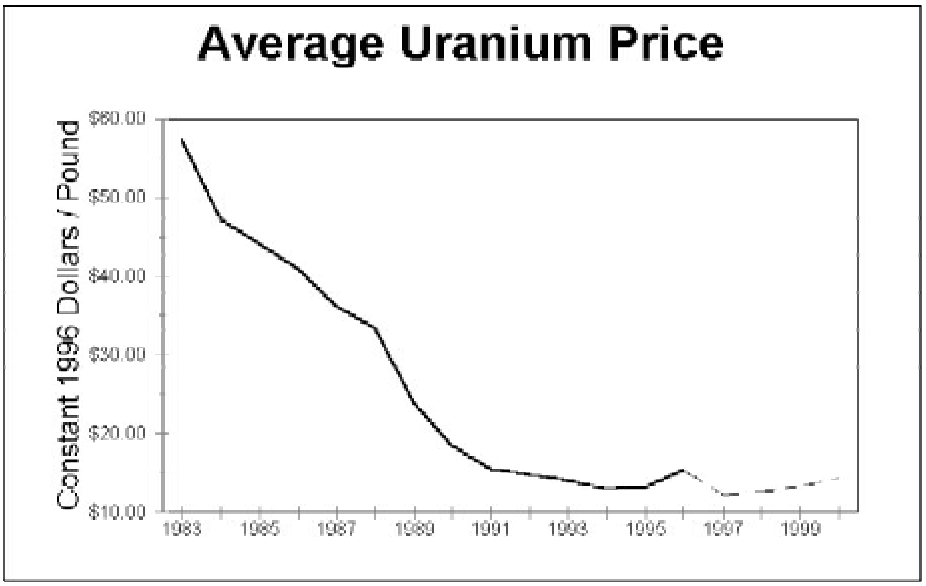


Figure 2.7

Table 2.1 Energy Prices in Utah, 1980-2000 (constant 1996 dollars)

	Field Price ($/Unit)			Average End-Use Price ($/Unit)									
Year	Crude Oil (barrel)	Natural Gas (mcf)	Coal Mine Price (ton)	Coal Delivered Price (ton)	No. 2 Distillate (gallon)	Gasoline (gallon)	Natural Gas Res (mcf)	Natural Gas Comm (mcf)	Natural Gas Indust (mcf)	Electric Power Res (MWh)	Electric Power Comm (MWh)	Electric Power Indust (MWh)	Uranium (pound)
1980	36.01	3.38	46.63	47.51	1.65	2.23	4.99	10.17	4.11	10.06	7.88	5.95	na
1981	56.93	3.12	0.00	48.16	1.74	2.29	5.39	8.92	4.30	9.92	8.26	6.14	na
1982	47.82	3.87	46.12	51.03	1.59	2.12	5.35	5.38	3.84	9.88	8.92	6.62	na
1983	42.28	3.85	42.58	46.41	1.44	1.69	6.40	6.49	4.74	10.39	9.40	6.55	57.45
1984	39.40	4.58	42.28	44.37	1.38	1.62	8.22	7.18	5.10	10.76	9.44	6.66	47.28
1985	33.61	4.53	38.82	45.33	1.30	1.59	6.81	6.88	4.53	10.91	9.64	6.98	44.06
1986	18.18	3.95	37.69	44.07	1.06	1.16	6.33	6.45	4.09	10.84	9.61	7.04	40.92
1987	22.77	2.41	33.95	38.42	1.10	1.23	6.57	6.59	4.23	10.51	9.32	6.52	36.20
1988	18.18	2.17	29.17	36.97	1.07	1.23	6.52	5.21	3.96	9.97	8.88	5.88	33.38
1989	22.83	1.97	26.97	34.37	1.15	1.26	6.30	5.10	4.04	9.05	8.26	5.04	23.96
1990	26.55	2.00	25.57	31.47	1.31	1.33	6.20	5.05	4.25	8.32	7.34	4.56	18.43
1991	22.58	1.74	24.35	30.95	1.15	1.24	6.14	5.08	4.17	8.04	6.91	4.48	15.43
1992	21.31	1.79	23.99	30.27	1.11	1.23	5.98	4.84	4.30	7.69	6.59	4.07	14.78
1993	18.72	1.90	22.68	29.29	1.08	1.17	5.50	4.35	3.93	7.34	6.38	4.05	14.07
1994	17.16	1.61	21.03	27.34	1.03	1.17	5.20	4.02	2.87	7.24	6.15	4.01	12.85
1995	18.09	1.17	19.52	25.81	1.03	1.16	4.84	3.72	2.39	7.02	6.10	4.00	13.19
1996	21.10	1.39	18.50	24.50	1.07	1.22	4.47	3.38	2.10	6.93	5.88	3.60	15.35
1997	21.04	1.39	17.91	23.48	1.07	1.21	4.47	3.38	1.95	6.93	5.88	3.34	11.64
1998	20.96	1.39	17.76	22.47	1.07	1.21	4.47	3.38	1.81	6.93	5.88	3.10	12.64
1999	20.87	1.39	17.61	21.49	1.07	1.21	4.47	3.38	1.68	6.93	5.88	2.88	13.33

3. ENERGY PRODUCTION

Recent Trends - Oil and Gas

Utah crude oil production continues the decade-long decline that began in 1986. Production from oil wells fell to 19.5 million barrels in 1996, a decrease of 2 percent from the 1995 level of 19.9 million barrels. (See Figure 3.1.) San Juan County again led all Utah counties with 6.6 million barrels of production. Duchesne County remained the second-largest producer with 6.1 million barrels, followed by Summit County with 3.2 million barrels in 1996, and Uintah County with 3.1 million barrels. All other counties combined amounted to about 2 percent of total state production.

Production of natural gas in Utah also declined in 1996. Following significant production declines at Utah's largest gas operation, Anschutz Ranch East in Summit County, a 7-year low of 281 billion cubic feet (Bcf) was produced in 1996, 9 percent below the 308 Bcf produced in 1995. Marketed production (gross production less reinjected and flared gas) also declined in 1996 to 251 Bcf; however the share of natural gas that was marketed was much higher than in past years. (See Figure 3.2.) Despite production declines, Summit County remained the leader in gas production with 54 percent of Utah's production, followed by Uintah, San Juan, Duchesne and Carbon Counties.

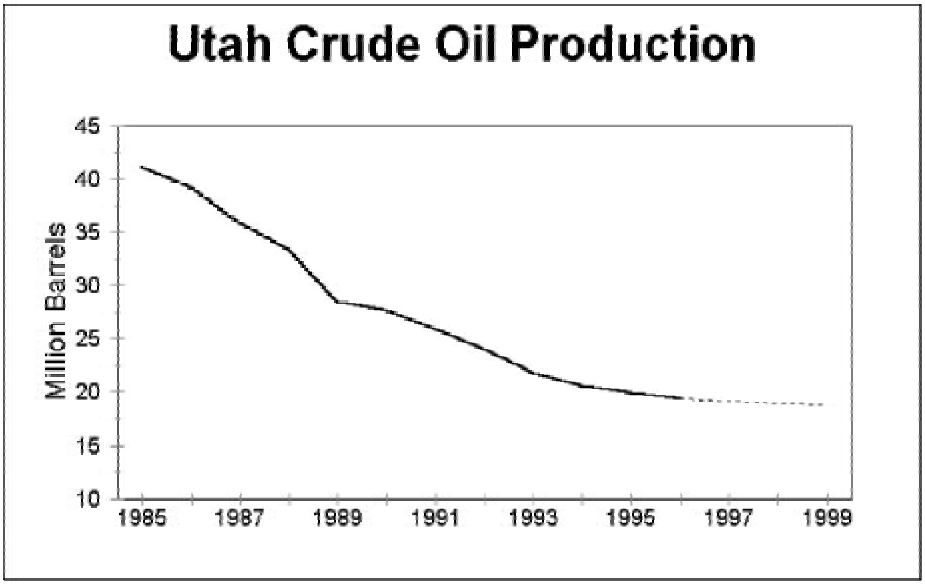
Key Indicators - Oil and Gas

Possibly the most critical factor for the future of oil and gas production is the market price. At its current low level of around $20 per barrel, the price of crude oil in Utah is not high enough to induce significant exploration. Although it is considered unlikely that any large oil fields remain undiscovered in Utah, numerous small fields may await exploration. Unless the price of oil rises above predicted levels, however, petroleum development companies will have little incentive to increase their efforts. Most exploration efforts are currently concentrated overseas, and wildcat drilling in Utah accounts for only 10 percent of total drilling.

Both development and production costs are higher than average in Utah. Local geology is such that Utah drilling operations require significantly more time than operations in areas such as the Gulf Coast. Relatively deep oil fields and 'waxy' crude in the Uintah Basin add even more to the cost of drilling and production.

Additional complications are introduced by the limited number of

Figure 3.1



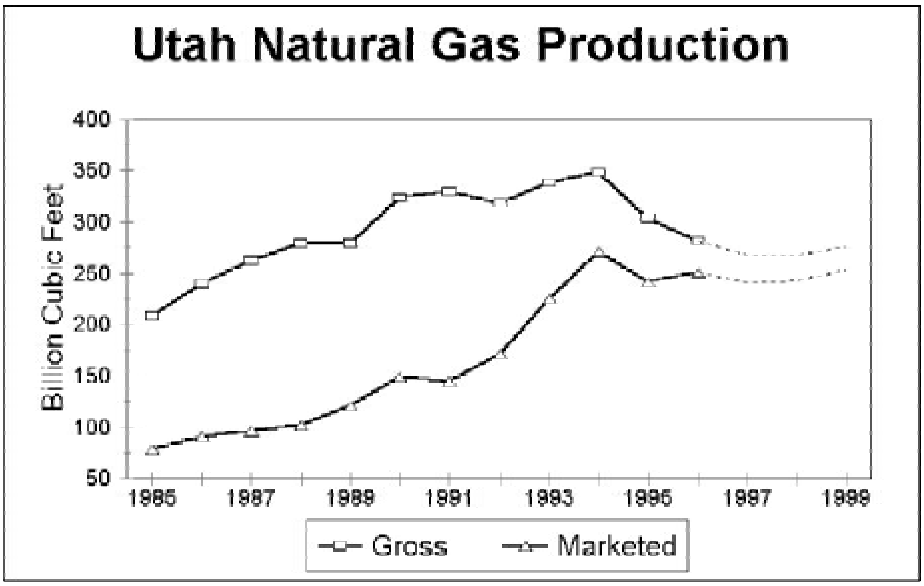


Figure 3.2

support service areas in the state. With the only major support service area in Vernal, Utah, mobilization costs in other parts of the state can be prohibitive. As in-state production continues to decline, new support service areas are unlikely to appear.

Possibly a result of high drilling and mobilization costs, Utah wells must be more than twice as productive than the national average. While the average well in the United States produces around 12 barrels per day, the average well in Utah produces nearly 27 barrels per day. Wells producing significantly less are generally not economical. Although many U.S. regions support low-production stripper wells, Utah supports mostly larger wells.

Despite the variety of financial and logistical disadvantages of oil production in Utah, the implementation of innovative drilling and recovery technology may support the industry for years to come. New technology has been so successful that production declines appear to be ending. Waterflood techniques are currently tripling the recovery rate of some wells in Duchesne County, and multilateral horizontal drilling is doubling recovery rates in experimental wells in the Aneth area of San Juan County. Widespread incorporation of these and other development technologies is expected to significantly improve the outlook for oil production during the next several years.

The combination of strong prices and coalbed methane extraction technologies may contribute to a bright future for natural gas production in Utah. Although seasonal, natural gas well-head prices have been on the increase during the past year and should support new gas production. River Gas of Utah has undertaken major coalbed methane operations in Carbon County, and Texaco and Anadarko are expected to soon expand operations of their own. New production in this area should not only curb Utah's production decline, but actually boost statewide production by the end of the 3-year forecast period.

Forecasts - Oil and Gas

Crude oil production should continue to decline through the forecast period, but the decline should be less than in past years. Falling an average of 1 percent each year, crude oil production is projected to be around 19,142 thousand barrels in 1997, and close to 18,855 thousand barrels in 1999. Gross natural gas production is expected to decline to about 267 Bcf in 1997, remain relatively constant during 1998, and rise to 275 Bcf in 1999 as numerous new wells begin production. Of the total gross production, approximately 240 Bcf should be marketed in 1997, and 253 Bcf marketed in 1999.

Recent Trends - Coal

Coal production in Utah has been on the rise since 1984. Having increased from 12.8 million tons in 1985 to 27.1 million tons in 1996, production is now more than 200 percent of what it was in 1985. Growth occurred almost every year and averaged just over 7 percent per year.

Increasing demand by electric utilities and overseas consumers has been the major impetus for increased coal production in the last decade. Growth during the mid-1980s was associated with the completion of the first two units of the Intermountain Power Plant (IPP). Expansion in the overseas export market drove further production increases at the end of the

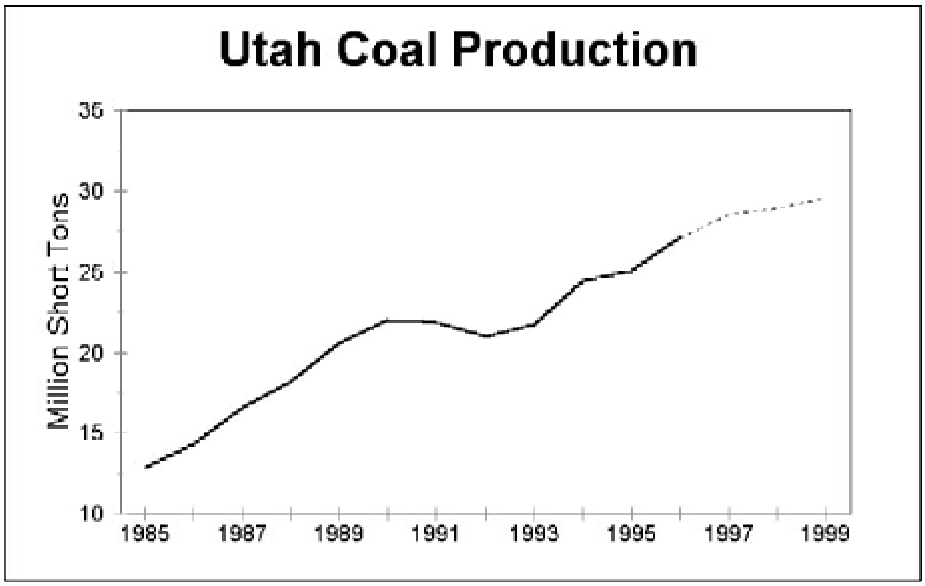


Figure 3.3

decade. During the mid-1990s, increased demand for Utah's low-sulfur coal by utilities outside of Utah, in addition to continued growth in overseas markets, pushed production even higher.

Indicators and Forecasts - Coal

Utah coal production for 1997 will surpass 28 million tons, reaching an all-time high in the industry's 128-year history. (See Figure 3.3.) Production is expected to increase throughout the forecast horizon and reach 29.5 million tons by 1999. Three factors will account for continued expansion: 1) increased industrial consumption in the West; 2) greater steam coal consumption by the electric utilities outside of Utah; and 3) higher export levels.

Due to added generation capacity and expanding demand for low-sulfur coal, electric utilities in both the West and the East will continue using greater amounts of Utah coal during the next three years. In addition, exports to the Pacific Rim will increase after an expansion of the Port of Los Angeles Dry Bulk Terminal. Because of the Pacific Rim expansion, industry analysts believe Utah coal exports will increase from 5.4 million tons in 1996 to more than 7 million tons by the end of the decade.

Recent Trends - Uranium

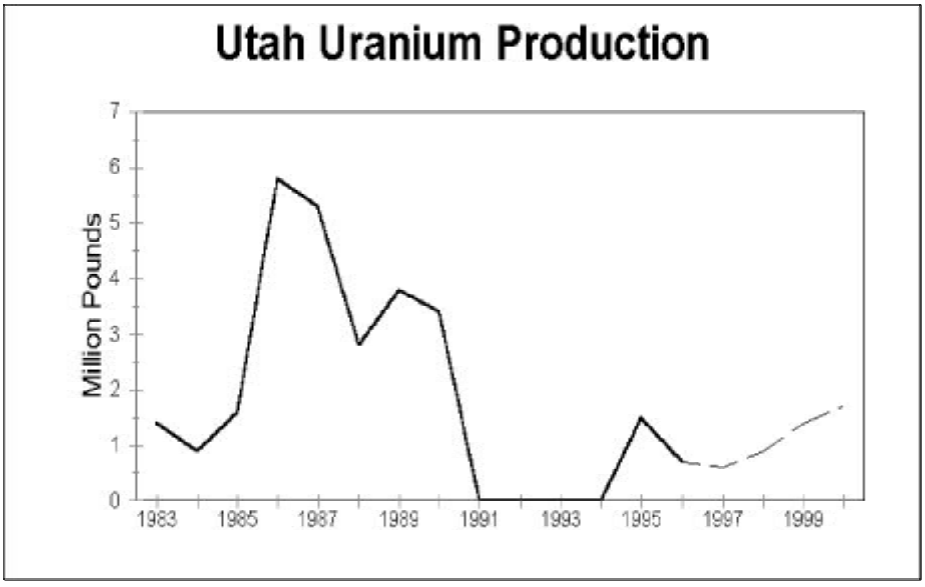
Aside from the 1991 to 1994 period, Utah has been a major player in U.S. uranium production and will most likely be a major player in the near future. Production of uranium in the United States peaked at 43.7 million pounds in 1980 and has since been on the decline. By 1986 it was just over 13.5 million pounds. Utah's production of 5.8 million pounds in that year was 43 percent of total U.S. production. By 1991 the persistence of a national glut of uranium caused the price to fall sharply, which led to a total stoppage of conventional uranium production in the United States.

By 1995 the market strengthened and Utah regained its status as the nation's leading producing state with 1.6 million pounds of uranium production. Uranium ore is mined in Arizona and Colorado and shipped to the White Mesa Mill located in Blanding, Utah, where uranium (yellowcake) is produced. In 1996 Utah uranium production dropped to 0.7 million pounds, a level representing approximately 11 percent of total U.S. production for that year.

Forecast - Uranium

With prices increasing from $11.64 in 1997 to $13.33 in 1999,

Figure 3.4



Utah uranium production should steadily increase. In 1998 the White Mesa Mill could produce at least 100,000 pounds of uranium, and it is also very likely that another 650,000 pounds of uranium could be produced using uranium ore from Arizona and Colorado. International Uranium Corp. could produce as much as 750,000 pounds of uranium in 1998, and U.S. Energy Corp. could produce 150,000 to 250,000 pounds.

In total, Utah uranium production should be about 600,000 pounds in 1997, increase to 900,000 pounds in 1998, and reach 1,400,000 pounds in 1999.

Table 3.1 Energy Production in Utah

	Crude Oil Production	Gross Natural Gas Production	Marketed Natural Gas Production	Coal Production	Uranium Production
	Million Barrels	Billion Cubic Feet	Billion Cubic Feet	Million Short Tons	Million Pounds
1985	41.144	208.803	78.906	12.831	1.6
1986	39.245	239.411	91.036	14.269	5.8
1987	35.835	262.045	96.360	16.521	5.3
1988	33.350	278.467	101.929	18.164	2.8
1989	28.512	278.437	120.445	20.517	3.8
1990	27.613	323.167	149.410	22.012	3.4
1991	25.940	329.470	144.817	21.875	0.0
1992	24.009	317.755	171.293	21.015	0.0
1993	21.809	337.852	225.401	21.723	0.0
1994	20.606	347.832	270.858	24.422	0.0
1995	19.940	303.233	241.290	25.051	1.5
1996	19.433	281.208	250.767	27.071	0.7
1997	19.142	267.148	240.433	28.515	0.6
1998	18.950	267.174	243.129	28.888	0.9
1999	18.855	275.190	253.174	29.554	1.4

4. MOTOR FUEL CONSUMPTION

Recent Trends

Gasoline and diesel fuel consumption surged during the 1990s and continues to grow at a rapid rate. Utah's expanding population drives an ever-increasing number of vehicles each year, and urban sprawl requires driving longer distances. In addition, exceptional economic growth has driven diesel fuel consumption to record highs. Motor gasoline consumption in Utah is now over one billion gallons per year and diesel fuel consumption is approaching 500 million gallons per year. Strong growth is expected for both fuels throughout the remainder of the decade.

Consumption of both motor gasoline and diesel fuel tends to be highly seasonal. Temperature and weather fluctuations are largely responsible for a distinctive, cyclical consumption pattern. (See Figure 4.1.) While winter temperatures and road conditions discourage driving, summer weather provides favorable driving conditions for both commercial and recreational travel. Not only do Utahns drive more during the summer, but out-of-state visitors fill the roadways in search of Utah's parks, forests and monuments.

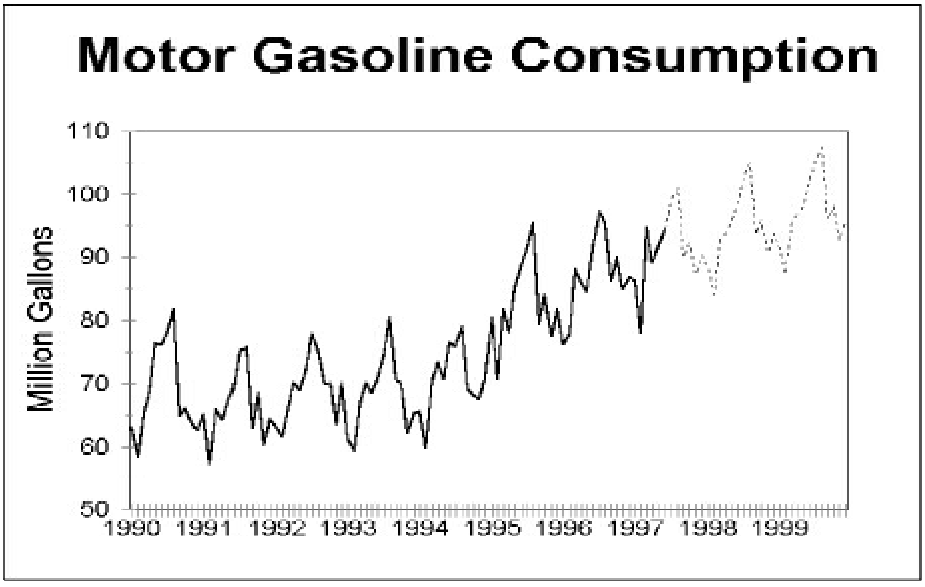
During the early 1990s gasoline consumption ranged from around 59 million gallons per month in the winter to 78 million gallons per month in the summer. In the spring of 1995, however, gasoline sales expanded well beyond historical precedent and reached 95 million gallons per month during the summer driving season. Current winter lows of 76 million gallons per month are nearly as great as summer highs just three years ago.

Diesel fuel consumption experienced a similar period of moderate growth from 1990 through 1994, ranging from around 23 million gallons per month in the winter to 33 million gallons per month in the summer. In 1995 demand shot up nearly 20 percent and by 1996 reached 42 million gallons per month in August and 33 million gallons per month in February. As with motor gasoline, diesel fuel consumption has grown so quickly that current winter consumption is greater than summer consumption just 3 years ago.

Gasoline Consumption

Several key variables relate closely to gasoline consumption: vehicle miles traveled (VMT), an estimate of total miles traveled by all vehicles in Utah each year; miles per gallon (MPG), a measure of fuel economy based on average miles traveled per gallon of gasoline consumed; and the average price per gallon.

Figure 4.1



VMTs have increased at just under 5 percent each year since 1990 and are expected to continue growing at a similarly explosive rate of 4 percent during the next 3 years. In 1996 Utahns drove just under 19.5 billion miles, up from 14.6 billion miles in 1990. Increasing at the projected rate, Utah driving may approach 22 billion miles per year by 1999.

Not all growth in Utah traffic volume can be explained by increasing numbers of cars and trucks. While VMTs grew at 4 percent per year in the 1990s, the number of vehicles in Utah grew at only 2 percent per year. This suggests individual cars and trucks are being driven farther each year. In fact, while each vehicle registered in Utah drove an average of 12,000 miles in 1990, each Utah vehicle now travels nearly 13,000 miles per year (as of 1996). Longer commutes and increased discretionary driving are largely responsible.

Gasoline prices, while remaining nearly constant in nominal terms over the past 6 years, have decreased significantly in real, inflation-adjusted dollar amounts. Demand for motor fuel generally responds in direct opposition to movements in gasoline prices, and if prices remain constant or drop slightly during the next three years, demand for gasoline should grow unhampered.

Diesel Fuel Consumption

Diesel fuel is used for both transportation and non-transportation purposes. Approximately 67 percent of diesel fuel is used for highway transportation, and the remainder is used for rail transport (10.8 percent), industrial processes (5.4 percent), construction equipment ("off-highway" use, 5.2 percent), commercial heating and power generation (4.3 percent), farm equipment (3.9 percent), residential heat (0.9 percent) and various other uses. (See Figure 4.3.)

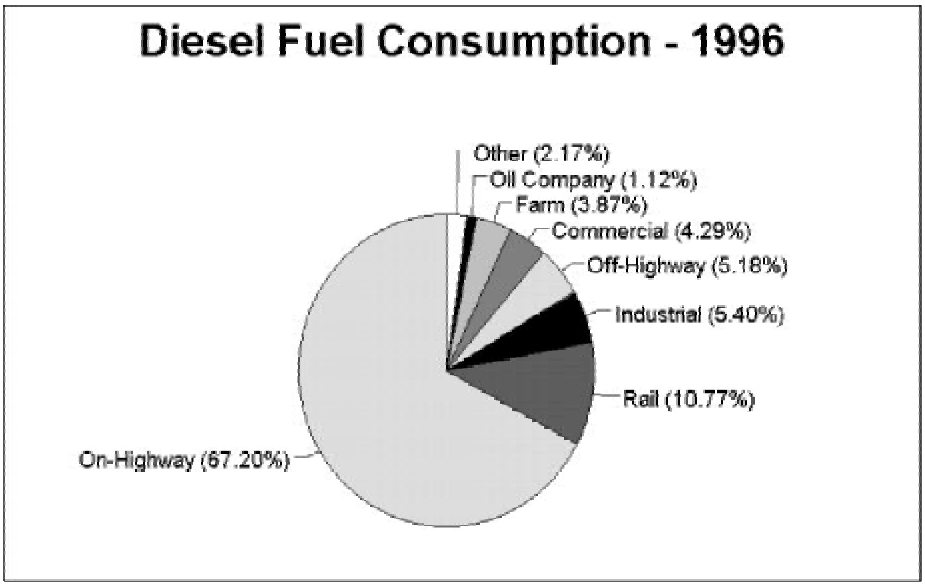


Figure 4.2

In the 1990s, diesel fuel consumption either dropped or remained stable for most end-user activities. Consumption by commercial, farm, rail and off-highway uses did not changed significantly, while residential and industrial uses dropped by about 30 percent as a result of fuel switching to natural gas. Highway diesel consumption was the exception, however, and increased by 50 percent in just 5 years. Expanding demand for highway diesel fuel accounted for nearly all of the growth in diesel fuel consumption during the 1990s.

Highway fuel demand increases are attributable to a vibrant state economy which grew nearly 8 percent in 1996. Continued economic growth is expected during the forecast horizon, and highway diesel fuel demand should continue to expand. In addition, major road construction projects in Utah are likely to boost off-highway construction use.

Natural gas is expected to continue to replace diesel fuel in the residential and industrial sectors. Nevertheless, total demand for diesel fuel is likely to continue to grow based on the strength of transportation and construction activity.

Forecasts

Consumption of motor gasoline is expected to continue growing at the current rapid rate of over 4 percent per year. In 1996 Utahns consumed 76 million gallons of gasoline in January and 97 million gallons in July. The monthly low in 1997 is expected to be about 79 million gallons. The monthly high, expected in August, may for the first time in Utah history exceed 100 million

gallons. Strong growth should continue through 1998 and 1999, producing winter lows of 84 thousand and 87 thousand gallons and summer highs of 105 thousand and 107.5 thousand gallons per month.

Diesel fuel consumption is also expected to rise substantially during the forecast horizon. Monthly consumption rates are expected to be between 33 million and 41 million gallons per month in 1997, and climb to a range of 34 million to 42 million gallons per month in 1999. Annual consumption increases of 2 to 3 percent are anticipated.

These forecasts reflect an assumed continuation of current trends during the 3-year forecast period, including population growth, strong economic growth, minimal improvements in motor vehicle fuel efficiency, increased miles traveled per driver, and continued low fuel prices.

Of these relevant factors, the one most subject to unexpected change is fuel prices. International crude oil prices can change course at any time in response to instability in the Middle East. In such an event, gasoline and diesel prices could rise substantially and curb the expected rate of growth.

Industry Trends

While oil embargoes and OPEC price increases once drove Americans to drive smaller, more fuel-efficient automobiles, exceptionally low gasoline prices and the popularity of large, fuel-inefficient trucks now encourage demand. Recently introduced sport utility vehicles (SUV) have become extremely popular, and consumers often prefer extra space, four-wheel drive and extra power. Such consumers have little concern for fuel economy.

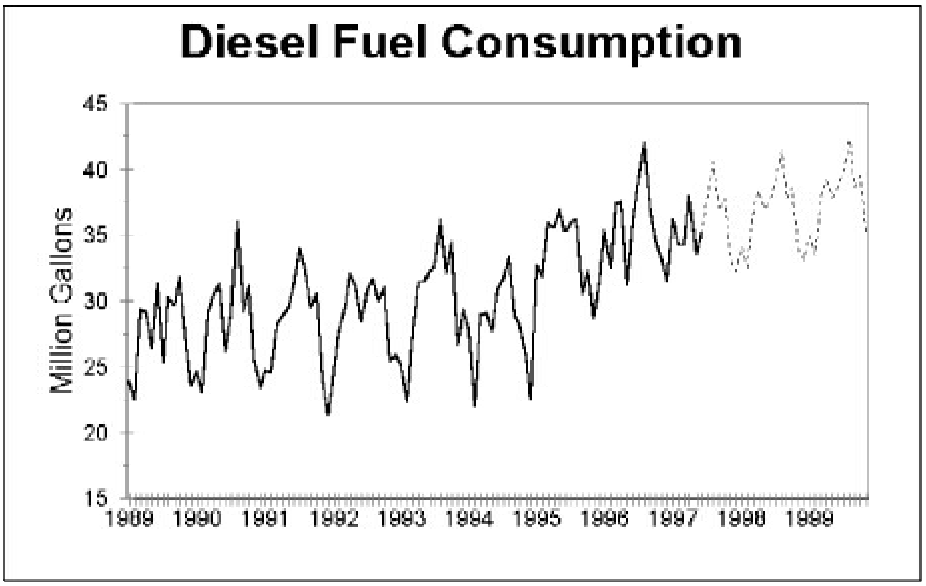


Figure 4.3

In the last five years the number of trucks and SUVs have swelled from 34 percent to 44 percent of registered vehicles. Fuel consumption has reflected this trend. From the mid-1970s until 1990, average fuel efficiency in the United States increased from around 13 miles per gallon to over 21 miles per gallon, yet during the last six years fuel efficiency has hovered around 21.5 miles per gallon. This trend is expected to limit fuel economy and increase consumption for the next several years.

During the next 3 years major construction projects on an important section of Interstate-15 may noticeably impact driving patterns and gasoline consumption. With capacity on primary commuter routes seriously reduced, drivers will be forced to find alternative routes on arterial roads or submit to traffic congestion on the construction-ridden interstate highway. Both options will require stop-and-go driving, driving at slower average speeds and in the case of the first option, driving longer distances. Longer driving distances will induce higher gasoline use, and stop-and-go traffic and slower speeds will reduce fuel economy and further inflate both gasoline and diesel fuel consumption. Efforts are underway to encourage car pooling, telecommuting and use of public transportation. Collectively, these alternatives may contribute to tempering growth in motor fuel use.

Table 4.1 Motor Fuel Consumption in Utah (Million Gallons)

		Motor Gasoline	Diesel Fuel
1996	Jan	76	35
	Feb	78	32
	Mar	88	37
	Apr	86	38
	May	85	31
	Jun	91	36
	Jul	97	39
	Aug	95	42
	Sep	86	37
	Oct	90	35
	Nov	85	33
	Dec	87	32
1997	Jan	86	36
	Feb	78	34
	Mar	95	34
	Apr	89	38
	May	92	34
	Jun	95	35
		Forecast Begins	
	Jul	99	38
	Aug	101	41
	Sep	90	37
	Oct	92	38
	Nov	87	33
	Dec	90	32
1998	Jan	88	34
	Feb	84	33
	Mar	93	37
	Apr	94	38
	May	96	37
	Jun	99	38
	Jul	103	39
	Aug	105	41
	Sep	94	38
	Oct	96	39
	Nov	91	34
	Dec	94	33
1999	Jan	91	35
	Feb	87	33
	Mar	96	38
	Apr	97	39
	May	98	38
	Jun	102	39
	Jul	106	40
	Aug	107	42
	Sep	96	39
	Oct	98	39
	Nov	93	35
	Dec	96	34

5. COAL CONSUMPTION

Recent Trends

Expanding coal consumption in Utah during the past decade was driven primarily by increasing demand for coal-fired electric power generation and the reopening of the Geneva Steel Mill. In 1986 the first of four units of Intermountain Power Agency's Intermountain Power Plant (IPP) was brought on line and began burning 2.5 million tons per year. In 1987 IPP's demand doubled when the second unit came on line.

After closing for one year, Geneva Steel reopened its mill in 1987 and added one million tons per year to Utah consumption. By 1988 total coal consumption in Utah had increased over 250 percent in just 4 years. Consumption dropped slightly in the 1990s, but has generally been stable. (See Figure 5.2.)

Key Indicators

The main consumer of coal in Utah is the electric utility industry. (See Figure 5.1.) The Hunter, Huntington and Carbon Plants of Utah Power can, in an average year, consume between 7.5 to 8 million tons of coal; IPP consumes 4 to 5 million tons of coal per year, and the Bonanza Plant of Deseret Generation and Transmission consumes 1.2 to 1.6 million tons of coal per year.

In total, Utah's electric utility industry consumes about 13.5 million tons of coal per year. The electric utility industry's consumption of coal is expected to remain stable or increase slightly in response to new demand for electricity.

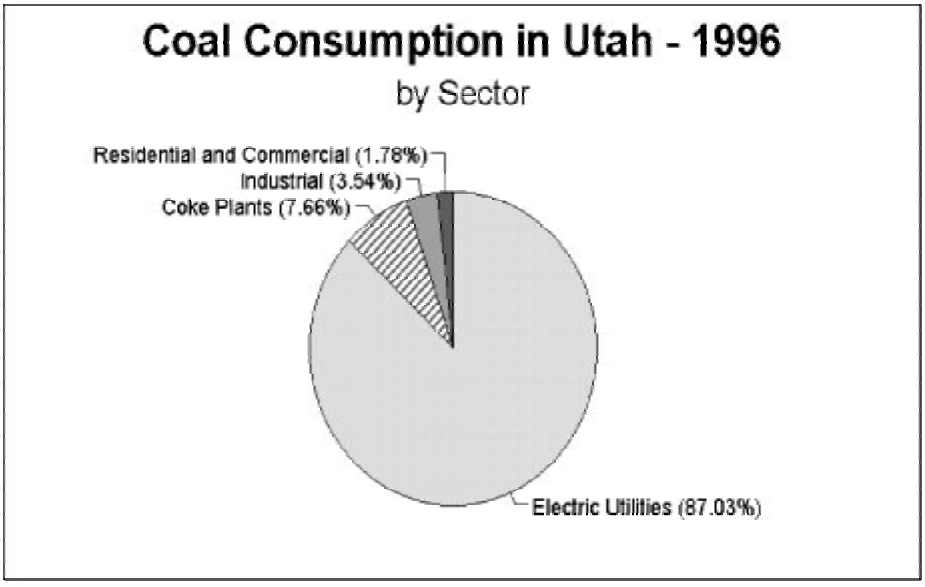
The local market for coking coal is limited to the Geneva Steel Mill in Orem. Geneva Steel is the only integrated steel mill operating west of the Mississippi River. In 1996 Geneva Steel consumed 1.12 million tons of coking coal from Colorado, Pennsylvania, Virginia and West Virginia. In 1996 total industrial coal consumption in Utah amounted to 517,000 tons.

Roughly 50 percent of the state's industrial coal consumption was attributable to Kennecott's operation in Bingham Canyon, and the remaining 50 percent to cement manufacturing plants and lime and gypsum operations in Utah. Kennecott Copper burned its coal to generate electricity for its own consumption. Industrial activity by coal-consuming industries should increase in 1997 and remain stable during the following 2 years.

Forecasts

Based on a moderate increase in demand for electric power, coal consumption by Utah's electric utilities is projected to increase to 13.7 million tons in 1997, and remain

Figure 5.1



mostly stable at around 14 million tons per year until 1999.

Industrial consumption should increase in 1997 and remain at around 650 thousand tons through 1999. Consumption at Geneva's coke plant should increase at a moderate rate and approach 1.2 million tons by 1999.

Residential and commercial consumption of Utah coal is no longer of much significance, with up to about one-quarter of a million tons per year. It is expected to remain stable in the foreseeable future.

In total, coal consumption in Utah is projected to be 15.7 million tons in 1997 and close to 16 million tons in 1999.

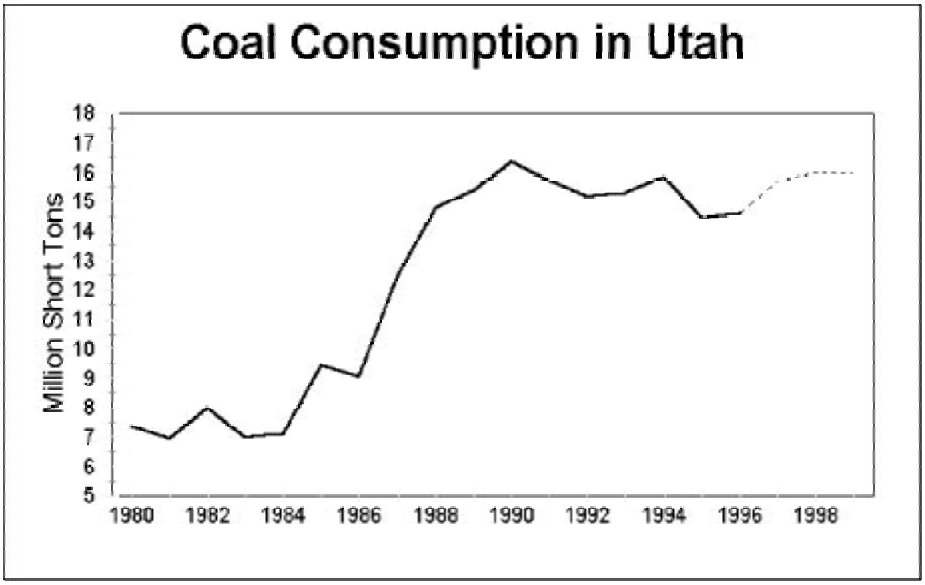


Figure 5.2

Table 5.1 Coal Consumption in Utah

YEAR	Electric Utilities	Coke Plants	Industrial	Residential & Commercial	Total
1980	5,224	1,464	427	237	7,352
1981	4,837	1,297	591	197	6,922
1982	6,153	831	812	177	7,973
1983	5,220	886	664	191	6,961
1984	4,912	1,392	551	258	7,113
1985	7,385	1,328	450	252	9,415
1986	7,614	868	374	191	9,047
1987	11,677	291	349	204	12,521
1988	12,533	1,259	739	236	14,767
1989	12,963	1,277	810	323	15,373
1990	14,053	1,296	619	382	16,350
1991	13,472	1,310	624	320	15,726
1992	13,136	1,182	497	349	15,164
1993	13,343	1,089	624	228	15,284
1994	13,839	1,198	647	157	15,841
1995	12,550	1,062	642	182	14,436
1996	12,728	1,120	517	260	14,625
1997	13,669	1,150	688	204	15,711
1998	14,002	1,164	643	207	16,016
1999	13,921	1,179	643	220	15,963

6. NATURAL GAS CONSUMPTION

Recent Trends

With few exceptions, Utah demand for natural gas has grown significantly during each year this decade. A combination of abundant supplies, relatively low prices and strengthening environmental regulations has made natural gas an attractive fuel for all economic sectors. In fact, within the last decade natural gas has again emerged as the nation's leading fuel for residential and commercial sector space heating.

Between one-half and two-thirds of natural gas sold to the residential and commercial sectors is used directly for space heating. Because demand for space heating depends heavily on local weather, dramatic temperature variation between winter and summer is the most significant driving force behind natural gas consumption in Utah. (See Figure 6.1.) In 1996, for example, demand for natural gas in January was more than 300 percent greater than demand in June.

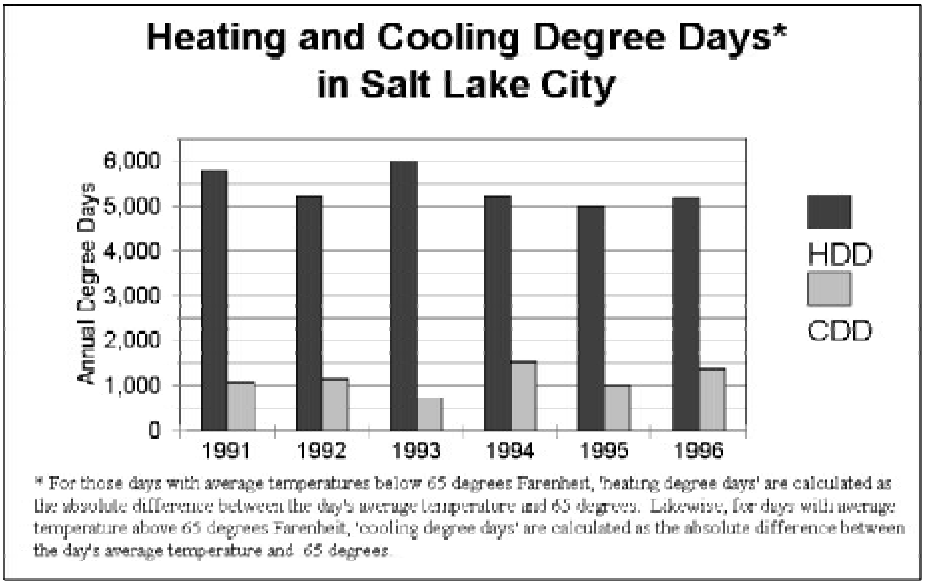
Strong population growth, an expanding economy, a growing gas distribution system and low prices all contribute to an expanding natural gas market. From 1990 to 1996 total gas consumption in Utah grew from 95 Bcf per year to 126 Bcf per year, an average increase of about 4.5 percent each year. Similar growth is expected to continue during the next 3 years.

Residential Use

Residential demand for natural gas grew an average of 3 percent per year during the 1990s, and reached 54 billion cubic feet (Bcf) in 1996. Increased demand was driven by growth in the number of customers using gas, which also grew at a steady 3 percent per year. Because the vast majority of that demand is used for space heating, consumption varied dramatically from month to month in response to weather. In 1996 for example, February consumption was 8,571 million cubic feet (MMcf), more than 6 times as much as the 1,351 MMcf consumed in June. (See Figure 6.2.)

Two important events defined residential sector consumption during the 1990s. One was the National Appliance Energy Conservation Act (NAECA), which took effect in 1992 and requires household appliances to meet specific efficiency standards. The second was natural gas superseding electricity as the leading energy source for space heating. While NAECA attempts to curb growth in residential energy demand, the popularity of natural gas appears to have counteracted efficiency gains

Figure 6.1



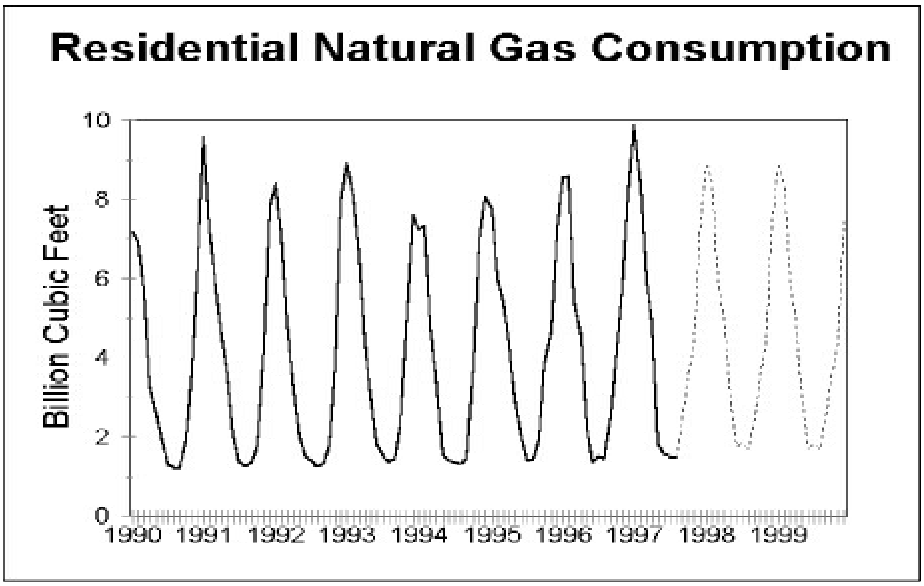


Figure 6.2

and pushed total consumption upward.

During the half century between the 1930s and the 1980s, electric power steadily overtook natural gas as the leading fuel in the national residential space heating market. During the 1930s less than 10 percent of residences used electricity for space heating, while 60 percent used natural gas. By the mid-1980s electricity claimed more than 50 percent of the space heating market and natural gas dropped below 40 percent. Natural gas regained its position as the leading heating fuel in the 1990s, and currently holds nearly 60 percent of the market in the West.

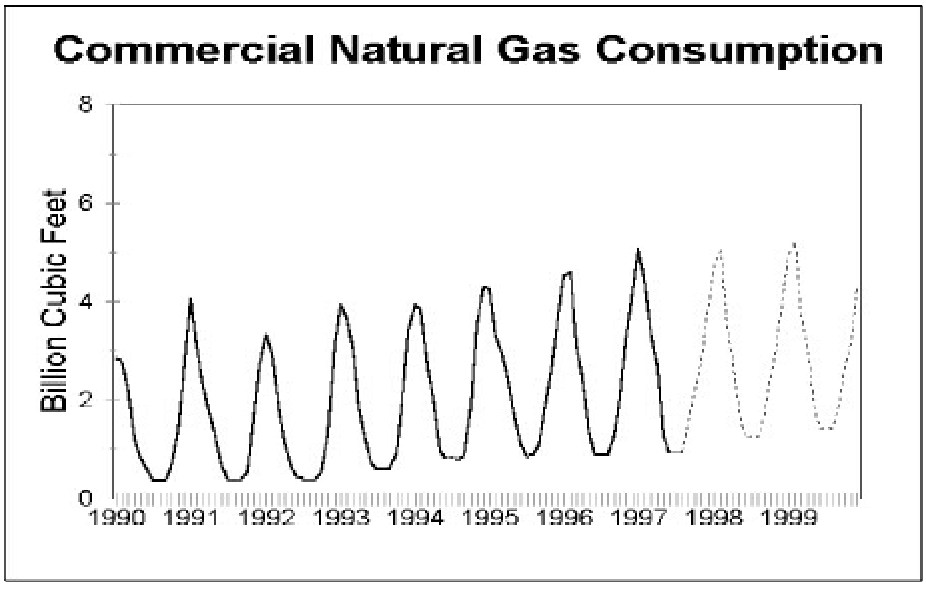
In Utah, the residential customer base should continue to increase, not only due to population increases, but as a result of potential pipeline expansions by the local utility. Mountain Fuel Supply Co. recently proposed expanding service into the Panguitch area, but new pipelines have not yet been approved by the Utah Public Service Commission. Most growth will result from Utah's expanding population but, as occurred in the early 1990s, service area expansions could also enlarge the customer base.

On a per capita basis, Utah residential natural gas use appears to be holding steady at around 26 MMcf per person per year. However, efficiency improvements are expected to be offset by increased use of gas for heating. An estimated 70 percent of new residential construction will incorporate natural gas as the primary space heating fuel. This trend may indicate an increased use of natural gas per person in Utah.

Stable gas prices are anticipated during the forecast horizon and should facilitate continued growth of natural gas use. Gradually increasing demand appears to be matched by gradually increasing supplies of natural gas in the West. Therefore, significant price increases are not anticipated.

Growing at around 2 percent per year, annual residential natural gas consumption should increase from 55.4 Bcf in 1997 to 57.7 Bcf in 1999. By 1999 monthly consumption is expected to range from approximately 1,670 MMcf per month in August to 8,850 MMcf in January. (See Figure 6.2.) Significant deviation from this forecast could occur during unexpected extreme weather events.

Figure 6.3



Commercial Use

Although the commercial sector uses less gas than either the residential sector or industrial sector, commercial demand experienced exceptional growth during the late 1990s. Increasing from 16 Bcf per year in 1990 to 29 Bcf per year in 1996, commercial demand nearly doubled in 7 years, growing an average of 9 percent per year.

Similar to the residential sector, commercial use of natural gas for space heating experienced a long decline from the 1940s to the 1980s. During the 1990s low gas prices encouraged a rebound in gas used for space heating, and gas now holds around 60 percent of the national commercial heating market. Continued low prices are expected to encourage installation of gas heating in new commercial buildings.

As with residential consumption, the majority of commercial purchases of natural gas is used for heating. Consumption, therefore, varies considerably from month to month and depends heavily on the prevailing weather conditions. For example, in 1996 the commercial sector burned 4,541 MMcf of natural gas in January, over 500 percent more than the 876 MMcf consumed in August.

Assuming normal weather conditions and continued low prices relative to electricity, commercial gas consumption is expected to grow at approximately 6 percent per year and reach 35 Bcf in 1999. Monthly consumption should range from around 927 MMcf to 5,051 MMcf in 1997 and grow to a range of 1,430 MMcf to 5,220 MMcf per month in 1999. (See Figure 6.3.)

Industrial Use

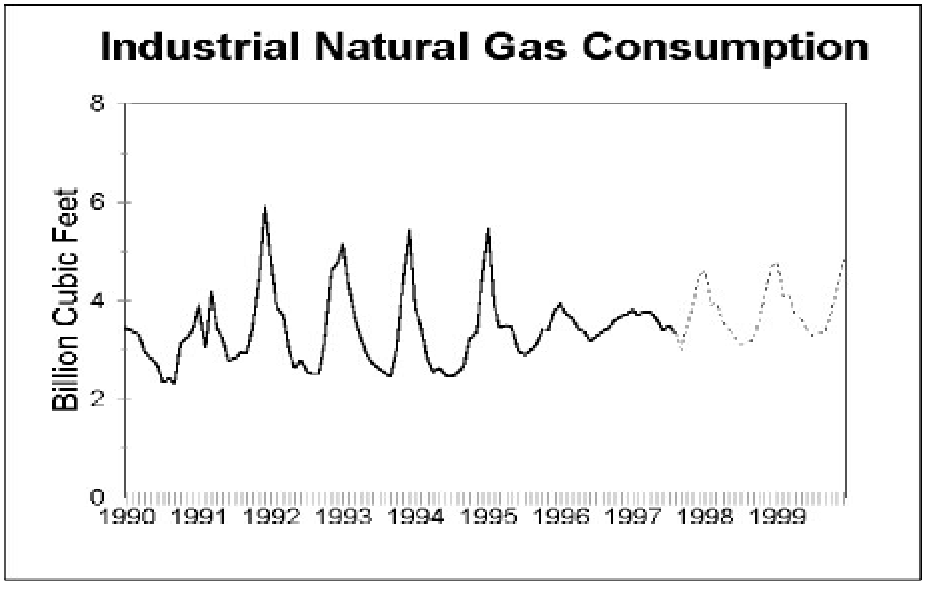
On a Btu basis, natural gas is the most heavily used fuel in Utah's industrial sector. Gas is used primarily for process heating, space heating and power generation, and supplies approximately one-quarter of all energy used by Utah industry. Unlike the steadily increasing residential and commercial sector consumption, industrial sector consumption has fluctuated considerably during the 1990s, but remained at 42.33 Bcf in 1996 - nearly unchanged from the 1995 level of 42.37 Bcf .

Despite some fluctuations in industrial consumption, overall consumption grew an average of 3 percent per year since 1990. A precipitous decline in industrial gas prices is partially responsible, and strong economic growth may explain the remainder. During the 1990s industrial gas prices dropped more than 40 percent, and industrial output increased an estimated 60 percent.

Because a relatively small share of industrial gas is used for space heating, consumption is not so heavily dependent on temperature and weather. This means that month-to-month variation is not as extreme as compared with residential and commercial consumption. (See Figure 6.4.) Temperature variation does cause some seasonal variation, however, and additional variability is caused by fuel switching by some industries that use more natural gas during the winter when air pollution standards are rigid. Large industrial consumers like Kennecott, for example, can burn coal during the summer but switch to natural gas during the winter.

In 1990 industrial gas consumption ranged from 2,302 MMcf to 3,445 MMcf per month. From 1992 to 1995 demand peaked to extraordinary levels during the winter, reach-

Figure 6.4



ing 5,400 MMcf each year, and dropped to around 3,000 MMcf per month in the summer. By 1996 seasonal demand fluctuation subsided and consumption ranged from 3,171 MMcf to 3,928 MMcf per month.

Based on anticipated low gas prices and an expanding state economy, growth in industrial consumption is expected during the forecast period. Industrial gas energy should continue to slowly decline. Consumption in 1997 should range from around 3,012 MMcf to 4,500 MMcf per month, increase at a moderate rate through 1998 and reach a range of about 3,300 MMcf to 4,800 MMcf per month in 1999. (See Figure 6.4.)

Table 6.1 Natural Gas Consumption by End-Use Sector

Year	Month	Residential (MMcf)	Commercial (MMcf)	Industrial (MMcf)
1996	Jan	8,555	4,549	3,917
	Feb	8,571	4,604	3,709
	Mar	5,419	3,129	3,625
	Apr	4,540	2,479	3,424
	May	2,252	1,356	3,364
	Jun	1,351	892	3,162
	Jul	1,533	904	3,253
	Aug	1,416	874	3,374
	Sep	2,540	1,273	3,436
	Oct	4,215	2,073	3,592
	Nov	5,749	3,185	3,663
	Dec	8,203	4,220	3,693
1997	Jan	9,876	5,051	3,809
	Feb	8,366	4,473	3,698
	Mar	5,945	3,363	3,777
	Apr	4,875	2,675	3,757
	May	1,821	1,268	3,633
	Jun	1,601	946	3,408
	Jul	1,501	927	3,482
	Aug	1,466	943	3,369
			Forecast Begins	
	Sep	2,503	1,535	3,012
	Oct	3,555	2,277	3,441
	Nov	4,432	2,863	3,909
	Dec	7,492	3,939	4,507
1998	Jan	8,867	4,780	4,614
	Feb	8,431	5,045	3,911
	Mar	5,937	3,486	3,955
	Apr	4,991	2,836	3,543
	May	3,045	1,713	3,443
	Jun	1,746	1,222	3,241
	Jul	1,861	1,272	3,102
	Aug	1,687	1,244	3,173
	Sep	2,486	1,718	3,183
	Oct	3,538	2,460	3,613
	Nov	4,415	3,057	4,080
	Dec	7,475	4,124	4,679
1999	Jan	8,851	4,962	4,786
	Feb	8,415	5,224	4,083
	Mar	5,920	3,676	4,127
	Apr	4,974	3,013	3,714
	May	3,028	1,900	3,614
	Jun	1,729	1,410	3,413
	Jul	1,844	1,456	3,273
	Aug	1,670	1,430	3,344
	Sep	2,469	1,900	3,355
	Oct	3,521	2,644	3,784
	Nov	4,398	3,251	4,252
	Dec	7,458	4,309	4,850

7. ELECTRICITY CONSUMPTION

Recent Trends

Utah's demand for electric power has grown steadily during the 1990s. Total consumption rose from 14,400 gigawatthours (GWh) in 1990 to 18,900 GWh in 1996, an increase of over 30 percent in just seven years. No single sector of the economy is responsible for this substantial growth as each of the residential, commercial, and industrial sectors has expanded an average of 4.5 percent per year.

Electric power use for heat and light is high during the cold, low-daylight winter months. Similar demand peaks coincide with hot summer months and strong demand for electric-powered cooling. While electricity demand was once highest during the winter months, increased use of cooling equipment in the 1990s has pushed summer demand well above normal winter use.

Key Indicators

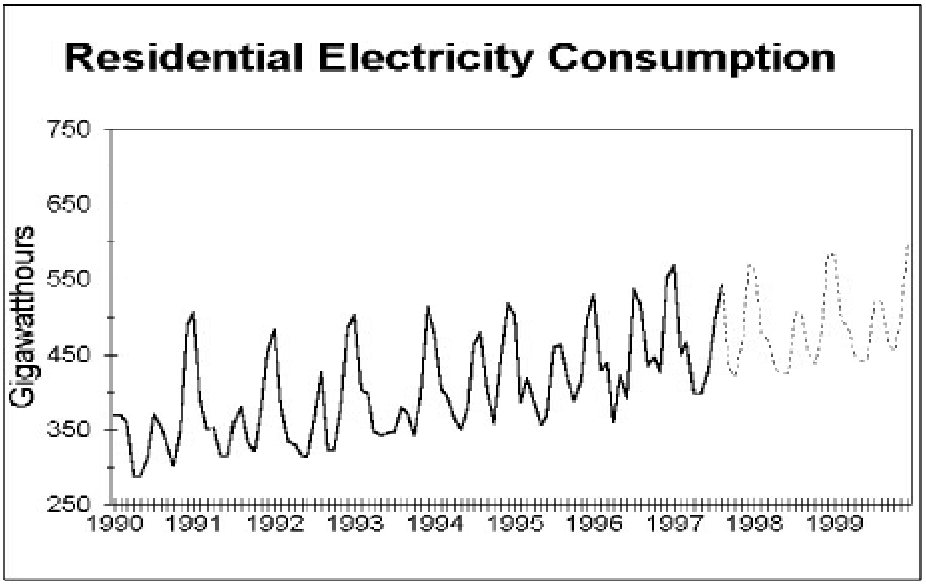
The most important indicator of monthly variability in electricity consumption is average temperature. (See Figure 6.1.) Electricity consumption follows temperature trends very closely, as evidenced by high residential and commercial electricity demand during the hot summers of 1994 and 1996. Because weather forecasting is virtually impossible, future temperature values are assumed to be "normal" or average during the forecast horizon.

Strong population growth has elevated Utah's electricity consumption and is responsible for the strong growth in annual residential sales. A particularly strong economy has seen retail sales grow between 6 and 12 percent each year for the past six years. This remarkable economic growth has also been the primary force driving commercial and industrial electricity use upward. Significant growth is expected to continue and is likely to boost electricity demand during the next 3 years.

Residential Use

Despite gradual efficiency improvements in household appliances, energy consumption continues to rise in the residential sector. Population increases are responsible for some of the new consumption, but much of the growth comes from the rapid proliferation of small household appliances such as televisions, VCRs, microwave ovens, personal computers and home security systems. Growth in appliance use is so high — around 6 percent per year during the last decade — that within the next 10 years appliances are expected to require more energy than any other single household energy use.

Figure 7.1



Efficiency requirements and technological improvements for household appliances have made heating, cooling, refrigerating and clothes washing far less energy intensive than ever before. Were it not for the abundance of small appliances, residential energy requirements per square foot would be considerably lower. Likewise, while basic heating and cooling systems are more efficient, a trend toward larger homes that require larger heating, cooling and lighting systems has caused total energy consumption per household to remain the same or increase.

From 1990 to 1996 the number of households in Utah grew from 538,000 to 650,000 -- 20 percent. During that same period residential electricity consumption rose from 4,184 GWh to 5,484 GWh -- just over 30 percent. In parallel with the national trend toward increased residential electric energy intensity, this shift elevated residential intensity (energy use per household) from 7.8 MWh per year to 8.4 MWh per year.

A notable trend emerged in 1996 that had not yet been observed in this decade. While residential electricity consumption typically peaks during the coldest winter months, and peaks again during hot summer months when cooling demands are highest, summer peaks have always been much lower than winter peaks.

In 1996, however, July consumption reached 536 GWh, noticeably above the 530 GWh consumed in January. Because the summer was hotter than average, the 1996 demand peak may have been an anomaly, but it does appear that summer demand is growing rapidly.

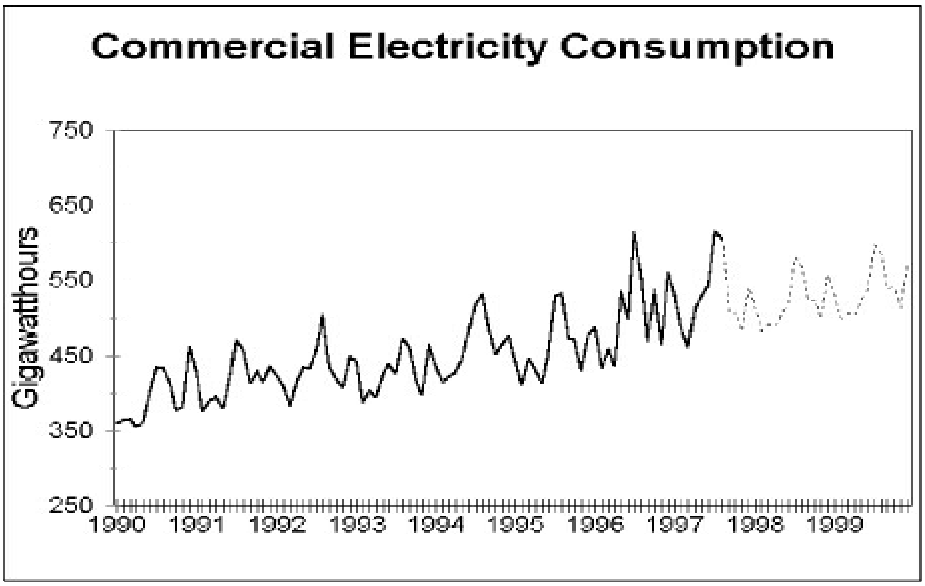


Figure 7.2

Significant increases in energy intensity in Utah residences, combined with population growth of more than 2.1 percent per year, is expected to drive electricity consumption up an average of 3.5 percent per year for the forecast horizon. (See Figure 7.1.)

In addition, new homes are expected to continue to be larger than existing homes and therefore have increased electricity requirements. On a monthly basis residential consumption is expected to range from 397 GWh to 568 GWh per month during 1997, and from 440 GWh to 600 GWh per month during 1999.

Commercial Use

Commercial sector electricity consumption has risen steadily during the entire decade. An expanding state economy is generally responsible for increases in commercial building space and in effect, new energy requirements. Unlike the residential sector, however, electric energy intensity has remained relatively constant.

Energy standards, improved technology and voluntary energy reduction programs have decreased lighting, heating and cooling requirements. Efficiency improvements, however, have been offset by increased use of electronic equipment, such as personal computers, fax machines and medical imaging devices. In effect, increased use of electronic equipment in the commercial sector has offset energy efficiency gains in lighting, heating and cooling.

Electricity consumption by the commercial sector has increased significantly from a range of 360 GWh to 460 GWh per month in 1990 to a range of 422 GWh to 614 GWh per month in 1996. (See Figure 7.2.) Unlike the residential sector, the

commercial sector consistently requires more electricity during the summer months than during the winter. Extraordinarily high consumption during the summer of 1996 may be a result of the hotter than average summer, but it also may indicate a trend towards higher summer demand. (See Figure 6.1.)

Utah's substantial economic growth is expected to continue, and therefore commercial square footage should continue to grow at a moderate rate. Commercial sector use of new, energy-intensive electronics, such as computers, telecommunications devices and medical equipment, is also expected to grow rapidly during the next three years. In total, demand for electricity is expected to grow approximately 3 percent per year, and range from 500 GWh to 600 GWh per month in 1999. (See Figure 7.2.) Although commercial buildings are continually being fit with less energy-intensive technology, change is gradual and improvements are unlikely to significantly offset growth in demand during the forecast period.

Industrial Use

Similar to both the residential and commercial sectors, industrial demand for electricity in Utah steadily grew during the past 7 years, and regularly fluctuated between winter demand peaks and summer demand lulls. (See Figure 7.3.) Seasonal temperature variation is responsible for annual fluctuations, and an unusually strong economy has produced the steadily rising demand throughout the decade.

Although most seasonal fluctuation during the 1990s has been consistent, monthly consumption during 1996 was unusually volatile. In 1990 industrial electricity consumption ranged from 423 GWh to 492 GWh per month and, after an average growth rate of five percent per year, ranged from 627 GWh to 715 GWh in 1996. Not only did the margin between high and low monthly consumption more than double, but the smooth annual variation was lost entirely and monthly variation appeared highly erratic.

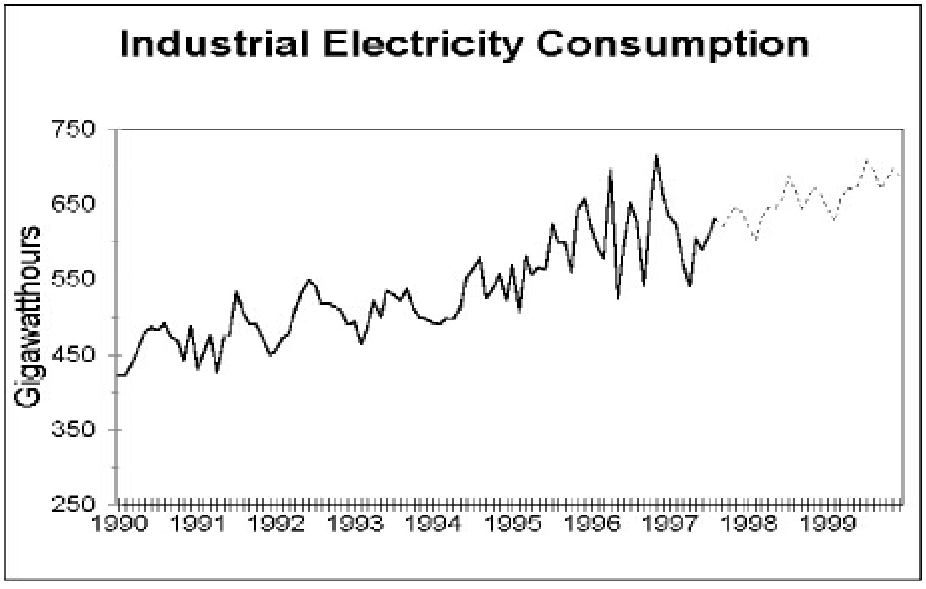
Three primary factors will influence future industrial electricity consumption: prices, economic growth and energy efficiency. The availability of abundant, inexpensive coal-fired generation in Utah renders significant price increases unlikely. Economic growth in Utah is currently higher than most areas in the nation and strong growth is expected to continue throughout the forecast horizon.

Electric energy efficiency (or "intensity") in the industrial sector is measured by the number of kilowatthours required to produce one dollar of output. During the early 1990s electric intensity dropped 7.7 percent from 0.90 kWh/dollar in 1990 down to 0.83 kWh/dollar in 1993. Although Utah estimates are not available for the past several years, energy intensity is, on average, decreasing nationwide. The same is presumably true for Utah's industrial sector. Decreasing electric intensity allows output to grow at a faster rate than energy consumption.

Monthly electricity demand by the industrial sector is expected to steadily increase from a range of 540 GWh to 648 GWh per month in 1997 to a range of 627 GWh to 711 GWh per month in 1999. (See Figure 7.3.) This represents an average annual growth rate of 3.8 percent.

Recent volatility in industrial consumption patterns may result from fuel switching capabilities.

Figure 7.3



Some industries have the ability to generate their own power using natural gas. If electricity purchased from utilities becomes significantly more expensive than on-site generation, some facilities may choose to reduce their purchases from utilities and generate their own power.

Table 7.1 Electricity Consumption in Utah - by Sector

Year	Month	Residential (GWh)	Commercial (GWh)	Industrial (GWh)
1996	Jan	530	488	619
	Feb	429	433	591
	Mar	438	459	577
	Apr	359	436	696
	May	423	535	524
	Jun	392	498	589
	Jul	536	614	651
	Aug	516	559	625
	Sep	434	468	541
	Oct	447	536	637
	Nov	427	464	715
	Dec	553	559	658
1997	Jan	568	532	633
	Feb	450	487	623
	Mar	466	461	572
	Apr	397	513	540
	May	398	528	604
	Jun	428	544	589
	Jul	494	615	611
	Aug	543	605	631
			Forecast Begins	
	Sep	434	507	621
	Oct	421	508	633
	Nov	466	483	648
	Dec	568	542	637
1998	Jan	565	512	621
	Feb	478	482	603
	Mar	469	491	630
	Apr	431	488	646
	May	424	507	645
	Jun	427	522	656
	Jul	505	582	687
	Aug	502	569	671
	Sep	451	523	645
	Oct	438	524	657
	Nov	483	499	673
	Dec	585	558	662
1999	Jan	582	529	645
	Feb	495	498	627
	Mar	486	508	654
	Apr	448	504	671
	May	441	523	670
	Jun	444	539	680
	Jul	522	598	711
	Aug	519	585	696
	Sep	467	539	670
	Oct	455	540	682
	Nov	500	515	697
	Dec	602	574	687

8. ENERGY EMPLOYMENT

Recent Trends

The energy industry includes a wide variety of energy-related activities, such as oil, gas and coal extraction, pipeline distribution, petroleum refining, electric power generation and electricity and natural gas distribution. (See Figure 8.1.) In the early 1980s the energy industry employed nearly 22,000 workers; however, after 15 years of steady decline it now employs only 12,000 workers, or about 2 percent of Utah's workforce. (See Figure 8.2.) Energy industry employment increased in only one year, 1993, which resulted from a tax incentive-induced surge in oil and gas production.

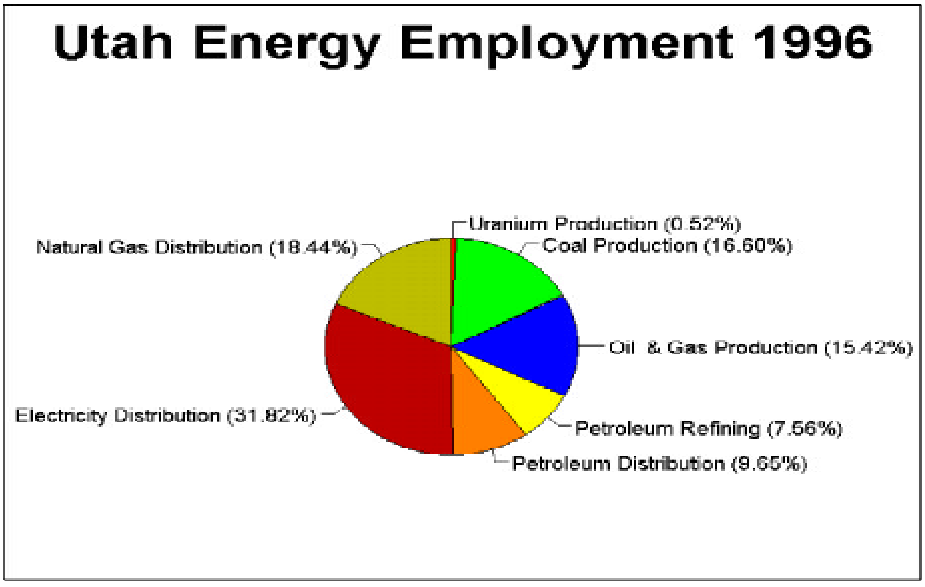
Most of the decline in employment during the last decade came from the oil, gas, coal and uranium industries. Low oil prices and high drilling costs have reduced the incentive to drill and develop new wells in Utah. As a result, oil and gas production employment fell rapidly. In response to a rapid decline in uranium prices and significant international competition, the uranium industry also experienced a rapid decline after 1980. Uranium production and processing employment fell 95 percent from 1,500 workers in 1980 down to just 65 workers in 1996. In contrast, the coal industry experienced significant production gains, but mining technology advanced so rapidly that coal can now be extracted with far fewer workers.

Electricity distribution employment rose slightly in the mid-1980s, and then declined more than 20 percent to just under 4,000 workers in 1996. Natural gas distribution employment remained relatively stable during the past 15 years and increased slightly to approximately 2,300 workers in 1996. Petroleum distribution employment fell steadily from around 2,000 in 1980 to 1,200 in 1996. This decline may have resulted form the closing of low-volume, full-service gas stations and the growth of large volume, automated convenience-store stations. Petroleum refining was one of the few industries to see increased employment, experiencing uneven growth from 890 in 1980 to 946 in 1996.

Forecasts

The employment outlook for Utah's energy industry depends on the projected industry activity and on projected industry productivity (output per worker). Crude oil exploration and development is expected to remain low, and employment should therefore gradually fall. However, new drilling and development of coalbed methane by the natural gas industry is expected to

Figure 8.1



require workforce additions. New develpment may offset decreases in oil industry employment. Combined oil and gas industry employment should decline slightly during 1997 and 1998, and level off by 1999 as gas drilling and production commences. (See Table 8.1.)

Technological innovation in underground coal mining has revolutionized the industry with respect to labor requirements. During the past 15 years Utah coal production has more than doubled, yet the number of workers required to produce those volumes has been cut in half. This represents an increase in coal miner productivity of about 400 percent. Coal production is expected to remain strong during the next three years, and coal employment is expected to rise slightly in 1997 to 2,142 workers, and then slowly drop to 2,062 workers by 1999.

After a dormant period during the early 1990s, Utah's uranium industry may be poised for a comeback. The combination of rising uranium prices and diminishing reserves at nuclear power plants may provide a boost to the domestic uranium industry, and the Southern Utah uranium industry may benefit as well. However, during the 1990s the United States has imported the vast majority of its uranium from foreign producers such as Canada and Russia. Because foreign uranium prices are generally much lower than domestic prices, the United States is likely to continue importing a large portion of its uranium supply.

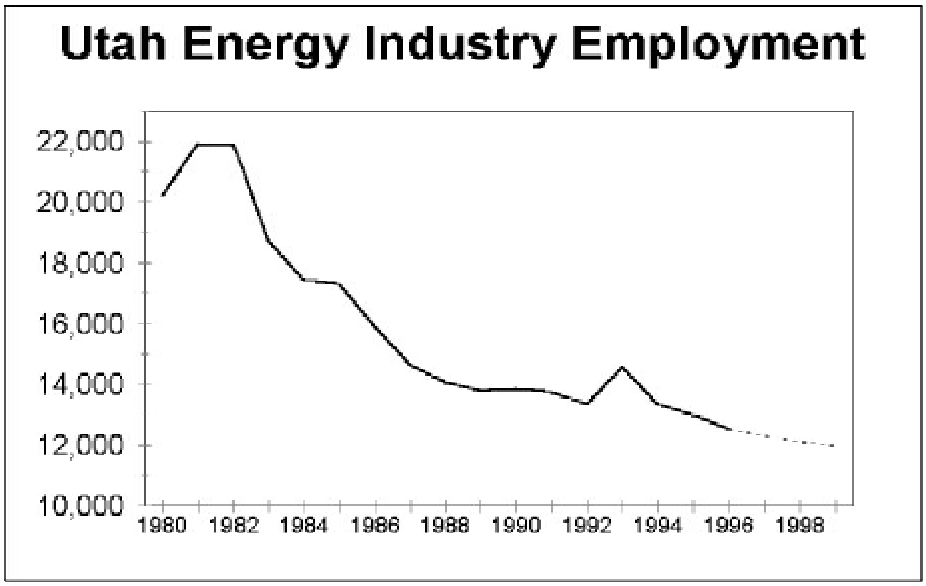


Figure 8.2

Although considerable uncertainty exists in the national and international uranium markets, the Utah uranium industry could benefit from rising prices. Employment is projected to increase from 65 workers in 1997 to 115 workers in 1999.

As gasoline stations continue their trend towards large-volume stations, petroleum distribution employment is expected to continue to slowly fall to about 1,150 workers by 1999. Activities at existing petroleum refineries should remain reasonably constant and no new refinery construction is expected during the next three years. Petroleum refinery employment should remain steady at around 950 workers.

Despite an expanding state population and strong economic growth, natural gas and electricity distribution employment have not increased since the mid-1980s. This lack of growth for natural gas distribution and slow decline for electricity distribution are likely the result of increased efficiency on the part of Utah's major utilities. Improved technologies permit electricity and gas systems to be managed by sophisticated electronic and mechanical devices, and modern computers require fewer workers to carry out billing and business transactions. Electric industry employment reductions began with the merger of Utah Power and Pacific Power in 1986.

In general, employment in Utah's energy industry is expected to decline, but the future remains uncertain. While overall efficiency and productivity will continue to rise and reduce the need for workers, the energy resource industry is often unpredictable and may provide surprises. Deregulation in the electric power industry adds even more uncertainty to the future, although removing regulation is generally expected to increase electric industry efficiency and reduce employment.

Table 8.1 Energy Employment in Utah

Year	Uranium Production	Coal Production	Oil & Gas Production	Petroleum Refining	Petroleum Distribution	Electricity Distribution	Natural Gas Distribution	Total
1980	1,532	4,536	4,519	879	2,075	3,777	2,863	20,181
1981	1,471	4,512	5,915	939	2,363	3,948	2,769	21,917
1982	1,113	5,063	5,401	875	2,302	4,163	2,960	21,877
1983	744	3,148	4,493	859	2,236	4,249	2,992	18,721
1984	376	2,784	3,962	811	1,952	4,736	2,809	17,430
1985	281	2,858	3,845	816	1,997	5,031	2,451	17,278
1986	353	2,770	2,426	794	1,933	5,262	2,360	15,898
1987	344	2,577	1,903	778	1,677	5,046	2,308	14,633
1988	290	2,575	2,023	788	1,418	4,687	2,279	14,060
1989	261	2,506	1,891	826	1,452	4,592	2,233	13,761
1990	235	2,535	2,138	897	1,371	4,452	2,238	13,866
1991	96	2,265	2,451	905	1,390	4,386	2,243	13,736
1992	91	2,216	2,455	843	1,379	4,172	2,212	13,367
1993	44	2,196	3,600	1,013	1,298	4,168	2,262	14,581
1994	66	2,132	2,338	997	1,248	4,232	2,342	13,354
1995	110	2,058	2,234	940	1,228	4,161	2,245	12,975
1996	65	2,077	1,929	946	1,207	3,980	2,306	12,509
1997	65	2,142	1,794	950	1,187	3,900	2,267	12,305
1998	75	2,101	1,704	950	1,168	3,822	2,267	12,087
1999	115	2,062	1,704	950	1,150	3,746	2,267	11,993

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